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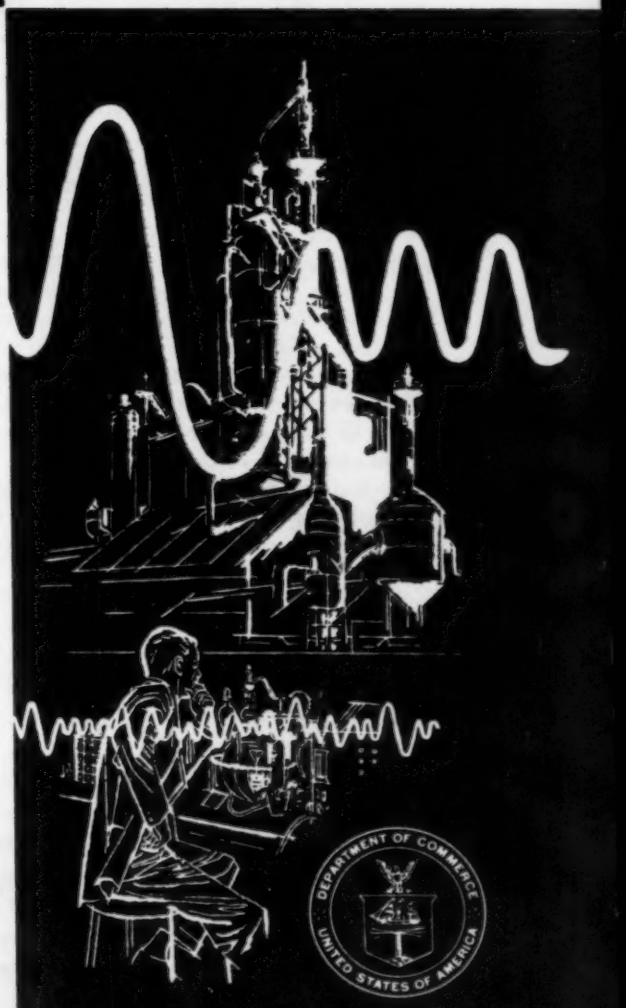

U. S. DEPARTMENT OF COMMERCE
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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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AD-412 378 DIV. 9

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AD-413 600 DIV. 9

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WIND TUNNEL TESTS OF A LOW-ASPECT RATIO WING IN CLOSE PROXIMITY TO THE GROUND.
AD-413 890 DIV. 1

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ROLLING MOMENTS OF FLAT WINGS IN AN OBLIQUE SUPERSONIC GAS FLOW.
AD-413 599 DIV. 9

*WINGS
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AERODYNAMICS OF SUPERSONIC WINGS AND BODIES OSCILLATING AT HIGH FREQUENCY.
AD-413 761 DIV. 1

*WIRE
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MAGNETIC PROPERTIES OF CUPRON WIRE AT LOW TEMPERATURES.
AD-412 714 DIV. 25

*WOUNDS & INJURIES
RADIOACTIVE ISOTOPES

THE ABSORPTION OF RADIOACTIVE FALLOUT PRODUCTS INTO THE BODY THROUGH BURNS AND OPEN WOUNDS.
AD-412 416 DIV. 16

*X-RAY DIFFRACTION ANALYSIS
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FEASIBILITY OF AUTOMATING INTENSITY COLLECTION PROCEDURES FOR CRYSTAL STRUCTURE STUDIES OF SEMICONDUCTING MATERIALS.
AD-412 593 DIV. 30

*X-RAY SPECTROSCOPY
TRANSITION ELEMENTS

SOFT X-RAY SPECTROSCOPY OF IRON, COBALT, NICKEL AND SOME ALLOYS AND COMPOUNDS OF IRON.
AD-412 791 DIV. 17

*X RAYS
HAZARDS

PORTABLE SURVEY METER FOR MEASUREMENT OF X RAY HAZARDS ASSOCIATED WITH RADAR (X-RAY HAZARD METER).
AD-412 481 DIV. 25

*X RAYS
SPECTRUM ANALYZERS

AN ANALYSIS OF PULSED X RADIATION GENERATED BY HIGH POWERED ELECTRONIC EQUIPMENT.
AD-412 820 DIV. 25

*ZINC ALLOYS
TELLURIUM ALLOYS

DATA SHEETS FOR ZINC TELLURIDE.
AD-413 939 DIV. 14

*ZINC COMPOUNDS
PHASE STUDIES

PHASE DIAGRAM FOR THE SYSTEM VANADIUM PENTOXIDE - ZINC OXIDE. ABSTRACT FOREIGN RESEARCH.
AD-412 635 DIV. 25

PHASE COMPOSITION, LUMINESCENT PROPERTIES, CRYSTAL STRUCTURE OF SYNTHETIC ZN SILICATES CONTAINING MN.
AD-413 011 DIV. 25

*ZIRCONIUM ALLOYS
PHYSICAL PROPERTIES

HIGH TEMPERATURE PROPERTIES OF HYDRIDED ZIRCONIUM-URANIUM ALLOY.
AD-412 586 DIV. 17

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-411 806 Div. 1, 12
(TISTA/LSK) OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
COMPARISON OF HIGH-GAIN-LINEAR AND SELF-ADAPTIVE FLIGHT CONTROL SYSTEMS FOR A TYPICAL WINGED RE-ENTRY VEHICLE,
by Robert E. Beale and Frazier J. Hellings.
May 63, 123p.
AFIT Rept. no. GGC EE 63 2
Unclassified report

Master's thesis.

Descriptors: (*Linear systems, Flight control systems), (*Adaptive control systems, Flight control systems), Re-entry vehicles, Boost-glide vehicles, Feedback, Wings, Rocket planes.

To establish the differences between self-adaptive and normal linear designs, both systems are applied to the problem of controlling the short-period dynamics of the X-15. The self-adaptive system studied is an early design of the MH-96 Autopilot. The high-gain-linear system is designed on the basis of selecting the forward-branch compensation so that the system is insensitive to vehicle-parameter variations over the bandwidth of the desired response and a pre-filter or feedback-branch compensation is used to obtain the desired command response. The root-locus method is used in the initial design of the system; but, the system could not be simulated on the analog computer. The frequency-response method was used for the design of a second system. From this linear analysis of design procedures and response data, it is concluded that the high-gain-linear system is preferred to a self-adaptive system; however, an analysis of the effects of system non-linearities and component noise must be made before a fixed-gain system can be applied to the physical problem of widely varying vehicle parameters. (Author)

AD-411 923 Div. 1, 5
(TISTE/CAM) OTS price $5.60

MITRE Corp., Bedford, Mass.
THE CHARM SYSTEM DESIGN,
by D. R. Israel, H. J. Kirshner, P. Stylos, and W. S. Nicol. 4 May 59, 45p. Rept. no. SR4
ESD TDR63 388 Unclassified report

Subcontract to Lincoln Lab., Mass. Inst. of Tech., Lexington, Contract AF19 122 458.

Descriptors: (*Air control centers, Programming (Computers)), (*Programming (Computers), Air traffic control systems), (*Air defense command, Programming (Computers)), Teletype systems, Input-output devices, Magnetic tape, Display systems, Remote control systems, Recording systems, Errors, Computer logic, Computer storage devices.

CHARM, an abbreviation for CAA High-Altitude Remote Monitor, is an exploratory effort in air traffic control and its integration and cooperation with air defense. CHARM's basic objectives are to test, evaluate, and demonstrate techniques and equipment which might in the future be incorporated in air traffic control or air defense systems. Two new techniques highlight CHARM's design: a manually operated teletype connected directly to the computer, with teletype acknowledgement to the operator; and transmission of a computer-generated display to a monitor console at a remote location over telephone data circuits. (Author)

AD-412 439 Div. 1
(TISTA/GEC) OTS price $1.10

Beech Aircraft Corp., Wichita, Kansas.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 37, 1-30 June 63,
by C. V. Lassmann. 9 July 63, 2p. Engineering rept. no. 4796
Contract NOw60 0060
Unclassified report

Descriptors: (*Aeronautical boombs, Design), Refueling-in-flight, Aircraft equipment, Research program administration.

AD-412 474 Div. 1
(TISTA/GEC) OTS price $16.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF A SAMPLED-DATA SELF-ADAPTIVE FLIGHT CONTROL SYSTEM,
by Daniel H. McGrath and Allison E. Keddy.
June 63, 136p.
Unclassified report

Master's thesis.

Descriptors: (*Adaptive control systems, Theory), Feed back, Aerodynamic characteristics, Aircraft, Digital computers, Noise, Oscillations, Stability, Damping, Integrated circuits, Linear systems, Computer logic.

A flight control system will adapt to changing dynamic pressure if the bandwidth of the aircraft and controller is maintained several times that of an optimum series model. The Bendix System studied achieves the required bandwidth by the use of a variable-gain device that remains proportional to the inverse of airframe gain. Measured and predicted error signals are sampled to provide digital information to the variable gain circuit. (Author)

AD-412 668 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF VIBRATION IN ROTARY WING AIRCRAFT,
by Ronald N. Phillips. 8 Apr 63, 15p.
NATC Flight Test technical memorandum no. 2 63
Unclassified report

Descriptors: (*Helicopters, Vibration), Instrumentation, Recording systems, Design, Specifications, Low frequency, Visual acuity, Stress (Physiology), Pilots, Human engineering.

An investigation was made of vibration in rotary wing aircraft. This report presents descriptions of types of instruments for measuring vibration and systems used to record this information, methods for reducing data, and results of studies to determine the effect of vibration on components and man. Methods for attenuating some of the transmitted vibrations are suggested and design specification requirements on helicopter vibration are proposed. (Author)

AD-412 963 Div. 1
(TISTA/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF THE CHARACTERISTICS OF AXIAL FOREPUMPS,
by I. V. Mirolyubov. 6 June 63, 13p.
FTD TT63 418 Unclassified report

Trans. from Izvestiya vysshikh uchebnykh zavedeniy, Seriya ''Aviatsionnaya Tekhnika,'' No. 1, pp. 81-88, 1959.

Descriptors: (*Airplane engines, Fuel pumps), (*Fuel systems, Rotary pumps), Cavitation, Turbo pumps, Hydrodynamics, Fluid dynamic properties, Impellers, Mathematical analysis, Fluid flow.

AD-413 008 Div. 1
(TISTP/WH) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
SOLUTIONS OF LONG-LINE GEODETIC AZIMUTHS BY PHOTOGRAMMETRIC TECHNIQUES.
Research rept.,
by Armando Mancini, Harry R. Kahler, Lyndon L. Sheldon, and Richard M. Moroney. June 63, 15p.
Proj. 7600
AFCEL 63 619 Unclassified report

Descriptors: (*Azimuth, Photogrammetry), (*Photogrammetry, Azimuth), Geophysics, Geography, Geodesics, Cameras, Mapping.

Formulas are derived for the determination of geodetic azimuths between two nonintervisible distant points employing photogrammetric techniques. Solutions are presented for the classical HIRAN azimuth reductions wherein only the azimuth component of observed directions are used. This is followed by a treatment of the 'space' solution utilizing observations on passive or active satellites. The classical method is developed on the Universal Transverse Mercator Grid (UTM); the latter directly on a spheroid. (Author)

AD-413 021 Div. 1, 5
(TISTB/AAR) OTS price $2.60

HRB-Singer Inc., State College, Pa.
HUMAN FACTORS CONSIDERATIONS IN THE DESIGN OF A MAINTENANCE FACILITY FOR THE AN/TSQ-47 SYSTEM.
Rept. no. 2,
by Robert B. King and Allen C. Busch. Apr 63, 34p. 353 R2
Contract AF19 628 439
ESD TDR63 326 Unclassified report

Descriptors: (*Air traffic control systems, Communication systems), Mobile, Maintenance equipment, Analysis, Effectiveness, Human engineering, Design.

This report presents a discussion of the functional requirements of a maintenance facility for the AN/TSQ-47 Mobile Air Traffic Control/Communications System. It analyzes the equipment and intended operational use of the system and indicates how problems involved in achieving maintenance efficiency should influence the functions of a system maintenance facility. The report also offers human engineering design considerations for such a facility. (Author)

AD-413 148 Div. 1, 9
(TISTA/GEC) OTS price $8.60

Bell Helicopter Co., Fort Worth, Tex.
AN EXPERIMENTAL INVESTIGATION OF A SECOND HARMONIC FEATHERING DEVICE ON THE UH-1A HELICOPTER.
June 63, 82p.
Contract DA44 177tc806, Task 1D121401A14604
TCREC TR62 109 Unclassified report

Descriptors: (*Helicopter rotors, Flight control systems), Flight testing, Harmonic analysis, Vibration, Aerodynamic loading, Rotary blades (Rotary wings), Stalling, Experimental data, Oscillations, Damping.

Results are presented of an experimental investigation of the effects of a second harmonic feathering device on a two-bladed, semirigid rotor helicopter. Flight tests were conducted with an Army UH-1A helicopter modified to incorporate a Bell-designed experimental Second Harmonic Control (SHC) Mechanism. Prior theoretical studies indicated that second harmonic feathering would be beneficial in delaying retreating blade stall and in reducing oscillatory loads and vertical vibrations in the cockpit. Air load data of this program are presented which show that pulsations in rotor thrust can be reduced with second harmonic feathering. Reductions in cockpit vertical vibrations and structural loads are shown for certain settings of the SHC; however, simultaneous reduction of vibrations measured at different locations in the fuselage and of loads in the rotor blades and the control system was not realized. A complete experimental evaluation of second harmonic feathering for the mitigation of retreating blade stall was hampered by unexplained, abnormally high vibrations and control loads encountered at high speeds. Analyses of such a system show that second harmonic feathering can reduce stall and the accompanying high drag on the retreating blade; however, increased drag from compressibility effects occurs at other points around the rotor azimuth, thus offsetting the effects from reducing retreating blade stall.

AD-413 150 Div. 1
(TISTA/FRL) OTS price $4.60

Hazeltine Technical Development Center, Inc., Indianapolis, Ind.
DESIGN, TEST, AND THEORY OF THE RADIAL GROUND SPEED INDICATOR.
Final rept.
Mar 63, 23p. Rept. no. 6115
Contract FAA BRD232, Projs. D1 514 and 115 1D
Unclassified report

Descriptors: (*Ground speed indicators, Design), Manufacturing methods, Tests, Flight testing, Test equipment, Environmental tests, Navigational aids.

The design, fabrication and testing is reported of three Radial Ground Speed Indicators and three General Aviation Radial Ground Speed Indicators. (Author)

AD-413 414 Div. 1, 5, 19, 30, 33
(TISTE/OHD) OTS price $9.60

Hazeltine Technical Development Center, Inc., Indianapolis, Ind.
SMALL, LIGHT-WEIGHT ALTITUDE TRANSMISSION EQUIPMENT.
Final rept.
Apr 63, 87p.
Contract ARDS477, Proj. 108 28 1D
Unclassified report

Descriptors: (*Telemetering receivers, Altimeters), (*Telemetering transmitters, Altimeters), (*Identification systems, Radio equipment), L band, Coding, Antenna lobes, Oscillators, Triodes, Transistor amplifiers.

This report describes the design and development of the small light-weight altitude transmission equipment (SLATE) for the Federal Aviation Agency Aviation Research and Development Service. Both SLATE I and SLATE II operate at a transmitter frequency of 1090mc and receiver frequency of 1030mc. SLATE I reply codes include any of 33 altitude codes plus an IDENT pulse. SLATE II reply codes include any one of 33 altitude codes in Mode C or codes 00 through 77 (64 codes), plus the IDENT pulse in Mode 3A. Both SLATE modes incorporate additional circuits to provide echo suppression and side lobe suppression. In conclusion, all specified performance characteristics were met or exceeded. The equipment size could be reduced by using miniature components. The increased cost, however, would offset the weight and space savings incurred. (Author)

AD-413 445 Div. 1
(TISTA/FRL) OTS price $3.60

Applied Psychology Corp., Arlington, Va.
THE ROLE OF VISIBLE TRAILS IN MID-AIR COLLISION PREVENTION.
Final rept. no. 3.
Aug 62, 27p.
Contract FAA BRD127, Proj. 110 512R, Tasks 9 and 20
Unclassified report

Descriptors: (*Aviation safety, Condensation trails), Aviation accidents, Effectiveness, Visibility, Dust, Smoke, Detection, Flight paths, Smoke generators.

Visual mid-air collision avoidance techniques are reported which deals with the use of intentionally generated visible trails. The aim was to determine the effectiveness of such trails as conspicuity aids under daytime VFR conditions. Analytical review of the literature covers detection of various clouds, dusts, smokes and mists, their capability of indicating flight path, and their possible use with information-coding techniques. Technical and operational considerations in using trails are also considered. (Author)

AD-413 521 Div. 1
(TISTA/LSK) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AIRCRAFT GYROSCOPES (SELECTED PARTS), by G. O. Firdlender and M. S. Kozlov. 20 May 63, 197p.
FTD TT62 1560 Unclassified report

Trans. from Aviatsionnyye Giroskopicheskiye Pribory, Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo, Oborongiz, Moskva, pp. 175-197, 243-377, 1961.

Descriptors: (*Gyroscopes, Flight instruments), Gyro compasses, Integrated circuits, Power supplies.

Contents: Aviation directional gyroscope, High-speed gyroscopes, Integrating gyroscopes, Gyroscopic power systems, and Gyroscopic systems unperturbed by inertia.

AD-413 584 Div. 1
(TISTA/OGEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE AIRWAYS - THE TU-124.
3 June 63, 3p.
FTD TT63 465 Unclassified report

Trans. from Kryl'ya Rodiny, No. 1, pp. 16-17, 1963.

Descriptors: (*Jet transport planes, Air transportation).

AD-413 626 Div. 1
(TISTA/GEC) OTS price $4.60

Applied Psychology Corp., Arlington, Va.
ALTITUDE EVASION IN VISUAL COLLISION AVOIDANCE.
July 62, 37p. Technical rept. no. 15
Contract FAA/BRD127, Proj. 110 512R
Unclassified report

Descriptors: (*Air traffic, Aviation safety), Aviation accidents, Reduction, Night flight, Visibility, Flight paths, Determination, Navigational lights, Aircraft equipment, Lighting equipment.

Findings of a program of studies and experiments conducted to determine ways to increase the collision-avoidance capabilities of VFR aviation have implications for possible air traffic rule changes. Principally, a change in the evasion rule for converging courses appears indicated. VFR collision-avoidance depends on early detection and timely determination of the range and relative altitude of the other aircraft. Pilots' ability to estimate range is good and can be improved by training. Altitude estimates are not as accurate, and training has no consistent effect. For night flight, an altitude-coded aircraft exterior light system can effectively provide relative-altitude and climb/descent infor-

mation; pilots have quickly and accurately learned such a system. Such information could be utilized to formulate altitudinal evasion rules which pilots could use more readily than the present rules based on horizontal evasion. (Author)

AD-413 761 Div. 1, 9
(TISTA/GEC) OTS price $4.60

Israel Inst. of Tech. (Haifa).
AERODYNAMICS OF SUPERSONIC WINGS AND BODIES OSCILLATING AT HIGH FREQUENCY.
Technical rept.,
by M. Hanin. 31 Jan 63, 42p. TAE rept. 26
Contract AF61 052 550
Unclassified report

Descriptors: (*Wings, Supersonic airfoils), (*Aerodynamic configurations, Supersonic characteristics), Oscillation, High frequency, Thickness, Three dimensional flow, Spikes, Slender bodies, Pressure, Boundary layer, Theory, Mathematical analysis.

Asymptotic solutions are obtained for the unsteady pressure on wings and bodies that oscillate harmonically at high frequencies while in supersonic flight. The solutions have the form of series in descending powers of the frequency, and they include effects of three-dimensional flow and second-order effects due to the thickness of the wing or the body. In the derivation, the oscillatory part of the flow is regarded as a perturbation superimposed on the steady isentropic flow past the wing or body in the mean position, and a method of eikonal representation is applied to the differential equations and boundary conditions of the oscillatory flow. The results consist of (a) the first two terms of the series for three-dimensional wings with supersonic trailing edges and for elongated pointed bodies, (b) the first three terms of the series for supersonic two-dimensional airfoils, and (c) the first four terms for very slender wings and bodies. The solutions (a) and (b) give the oscillatory pressure to the second order in thickness when the steady-flow distribution on the surface is known to this order from available theories or from experiment. The leading terms of the solutions coincide with the piston approximation while the higher terms depend directly on the curvatures of the surface. (Author)

AD-413 843 Div. 1, 9
(TISTA/GEC) OTS price $19.75

Wichita U., Kans.
TABULATED PRESSURE DATA FOR A CIRCULAR, ANNULAR JET GROUND EFFECT MACHINE MODEL. 0.01 0 DEGREE DYNAMIC CASE.
June 62, 1v. Engineering rept. 352 8
Contract Nonr20103
Unclassified report

Descriptors: (*Ground effect machines, Pressure), Aerodynamic characteristics, Stability, Annular nozzles, Model tests, Wind tunnel models, Experimental data.

Tabulated pressure data are presented for a series of circular, annular jet ground effect machines. The pressures listed are the differential above and below atmospheric in pounds per sq. ft. A heading on top of each page identifies the test point presented and provides auxiliary information which may be useful in interpreting the columnar data. (Author)

AD-413 844 Div. 1, 9
(TISTA/GEC) OTS price $19.75

Wichita U., Kans.
TABULATED PRESSURE DATA FOR A CIRCULAR, ANNULAR JET GROUND EFFECT MACHINE MODEL, 0.01 30 degrees DYNAMIC CASE.
June 62, 1v. Engineering rept. 352 8
Contract NONR201 3
Unclassified report

Descriptors: (*Ground effect machines, Pressure), Aerodynamic characteristics, Stability, Annular nozzles, Model tests, Wind tunnel models, Experimental data.

Tabulated pressure data are presented for a series of circular, annular jet ground effect machines. The pressures listed are the differential above and below atmospheric in pounds per sq. ft. A heading on top of each page identifies the test point presented and provides auxiliary information which may be useful in interpreting the columnar data. (Author)

AD-413 845 Div. 1, 9
(TISTA/GEC) OTS price $17.95

Wichita U., Kansas.
TABULATED PRESSURE DATA FOR A CIRCULAR, ANNULAR JET GROUND EFFECT MACHINE MODEL 0.01 60 DEGREE DYNAMIC CASE.
June 62, 1v. Engineering rept. 352 8
Contract Nonr2013
Unclassified report

Descriptors: (*Ground effect machines, Pressure), Aerodynamic characteristics, Stability, Annular nozzles, Model tests, Wind tunnel models, Experimental data.

Tabulated pressure data are presented for a series of circular, annular jet ground effect machines. The pressures listed are the differential above and below atmospheric in pounds per sq. ft. A heading on top of each page identifies the test point presented and provides auxiliary information which may be useful in interpreting the columnar data. (Author)

AD-413 879 Div. 1, 5
(TISTE/WA) OTS price $9.10

Radio Corp. of America, Burlington, Mass.
INVESTIGATION OF ELECTRONIC PROBLEMS IN THE DESIGN OF MAINTENANCE FACILITIES FOR THE AN/TSQ-47 SYSTEM.
Final rept., 1 July-30 Nov 62,
by James J. Lauginiger, Gerald E. Surette and Edgar J. Thomas. Mar 63, 98p.
Contract AF19 628 490
ESD TDR63 302 Unclassified report

Descriptors: (*Maintenance equipment, Air traffic control systems), (*Air traffic control systems, Maintenance), Test equipment (Electronics), Search radar, Radar equipment, Radio communication systems, Air transportation, Air Force equipment, Design.

This report isolates, analyzes and discusses maintenance problems associated with assuring an effective deployment, of the AN/TSQ-47 system. It provides relevant maintenance concepts, and preliminary design guidelines, for the design of the maintenance facilities. The field maintenance problem is examined in reasonable depth, since it has the most immediate affect on the system performance during the anticipated

brief deployment periods. The concepts on which the design of field maintenance facility is based is a centralized field maintenance shelter for the air traffic control group consisting of RAPCON, TOWER, SEARCH, AND PAR; and self-sufficient operational shelters for the air traffic support group consisting of TACAN and COMMUNICATION CENTRAL. (Author)

AD-413 890 Div. 1, 9
(TISTA/FRL) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
WIND-TUNNEL TESTS OF A LOW-ASPECT-RATIO WING IN CLOSE PROXIMITY TO THE GROUND,
by Herbert E. White. June 63, 1v.
DTMB AERO Rept. 1056 Unclassified report

Descriptors: (*Wings, Aerodynamic characteristics), Model tests, Wind tunnel models, Angle of attack, Jet flaps, Lift, Drag, Wind tunnel models, Aspect ratio, Camber, Deflection, Pitch (Motion), Ground effect, Ramjet engines.

Wind tunnel tests were conducted on a semispan wing model with an aspect ratio of 2 in simulated ground effect. The variation of aerodynamic coefficients with changes of angle of attack, surface camber, and trailing-edge clearance were measured. Improvements in lift/drag ratio due to ground proximity and due to end plates were determined. The lift/drag ratio of the model with end plates ranged in general between 30 and 40; without end plates, it was about half as large. The piching-moment data indicate that an additional stabilizing surface or artificial stability will be required. (Author)

AD-413 924 Div. 1, 9
(TISTA/FRL) OTS price $9.10

Martin-Marietta Corp., Orlando, Fla.
RECIRCULATION PRINCIPLE FOR GROUND EFFECT MACHINES: INVESTIGATION OF IMPROVEMENTS BY MAJOR MODIFICATIONS TO MCTV.
Final rept., Nov 62-Jan 63.
July 63, 96p. Rept. no. OR3159
Contract DA44 177AMC9T, Task 1D021701A04804
TRECOM Technical rept. 63 27
Unclassified report

Descriptors: (*Ground effect machines, Exhaust nozzles), (*Exhaust nozzles, Aerodynamic characteristics), Performance (Engineering), Model tests, Two-dimensional flow, Test facilities, Experimental data, Lift, Stability, Control, Velocity, Manometer.

Analytical studies and experimental investigations were conducted to determine the best overall man carrying test vehicle (MCTV) performance obtainable with essentially major modifications. Testing was done in the existing two-dimensional test facility with various configurations of old (existing) and new two-dimensional recirculating ejector models. Based on these experimental data, estimates are made as to the lifting capability, static stability and control of the proposed modified MCTV. In addition, experimental data is presented for the use of skirts and trunks for several configurations. The effect of ground surface roughness is also considered. (Author)

AD-413 980 Div. 1, 26
(TISTE/JBM) OTS price $7.60

Battelle Memorial Inst., Columbus, Ohio.
DESIGN CRITERIA FOR HIGH-SPEED POWER-TRANSMISSION SHAFTS.
Quarterly rept. no. 2, 15 May-15 Aug 63,
by R. G. Dubensky, H. C. Meacham, and J. E. Voorhees. Aug 63, 60p.
Contract AF33 657 10330, Proj. 8128, Task 812802
ASD TDR62 728 Unclassified report

Descriptors: (*Drive shafts, Transmissions), (*Helicopter engines, Drive shafts), (*Transmissions, Drive shafts), Vibration, Velocity, Damping, Supports, Springs, Standing wave ratios, Transmission lines, Analysis, Steel, Models (Simulation), Torque, Deflection, Motion, Programming (Computers), Theory, Stresses, Gas turbines, Tables.

Research was continued on the establishment of a design procedure for ultra-high-speed power transmission shafting. Amplitudes of vibration of high-speed shafts were obtained from laboratory experiments designed to determine the effect of (1) using a single damper near one end of the shaft (2) using two dampers, one near each end of the shaft (3) using various spring constants and damping coefficients in the damper-support assemblies. Measured amplitudes were compared with calculated voltage standing wave ratios, based on a transmission line analogy. The majority of this work was conducted on a 1/2-inch diameter steel shaft, 138 inches long, having fixed ends. Work on shafts having simply supported ends was also started. The design of a hypercritical shaft system for a Vertol Chinook helicopter was started along with a modelled shaft system which will be evaluated in the laboratory. The laboratory setup necessary to evaluate the effects of shaft torque, curvature, and vibration was completed together with analytical work to predict these effects. The design of a damper which will damp angular shaft motion as well as vertical motion was also completed. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-411 815 Div. 2
(TISTP/FEM) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
A DESCRIPTION OF INSTRUMENTATION AND METHODS USED FOR MAKING DOUBLE-RAWIN SOUNDINGS AT THE U. S. NAVAL ORDNANCE TEST STATION,
by Paul H. Miller. July 63, 14p.
NOTS TP3242
Unclassified report

Descriptors: (*Atmospheric sounding, Radiosondes), (*Winds, Upper atmosphere), (*Meteorological instruments, Hypsometers), (*Radiosondes, Design), Data, Barometric pressure, Measurement, Geometry, Instrumentation, Electronic equipment, Data processing systems, Digital computers.

The unique double-rawin complex and associated IBM 7090 data-reduction techniques developed at the U. S. Naval Ordnance Tests Station to obtain more accurate winds-aloft data are described. Schematic diagrams of the electronic modifications and additions to standard equipment, together with the IBM 7090 data-reduction program, are presented. (Author)

AD-411 861 Div. 2
(TISTP/FR) OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
61 CYGNUS AS A TRIPLE SYSTEM,
by A. N. Deych. 23 July 63, 2p.
RSIC Rept. no. 35 Unclassified report

Trans. from Priroda, 33, 1944.

Descriptors: (*Stars, Planets), Identification.

AD-411 951 Div. 2
(TISTP/RLG) OTS price $5.60

Rand Corp., Santa Monica, Calif.
FLIGHT REGIMES IN THE ATMOSPHERES OF VENUS AND MARS,
by Peter P. Wegener. July 63, 49p. Memo. RM3388PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Planetary atmospheres, Numerical analysis), Mars, Venus, Data, Atmosphere models, High altitude, Aerodynamic characteristics, Cloud cover, Atmospheric temperature, Troposphere, Upper Atmoshpere, Atmosphere, Density.

Preliminary estimates of the flight parameters to be encountered on Mars and Venus are desirable. Although considerable qualitative information on the two planets is available, there are few quantitative data that contribute to an understanding of their atmospheres. From the available quantitative data, limiting models of the two atmospheres have been constructed, and from these models it has been possible to estimate the approximate extremes of aerodynamic parameters likely to be encountered. It is seen that the uncertainties in aerodynamic flight conditions encompass orders of magnitude, particularly at high altitudes. (Author)

AD-411 979 Div. 2
(TISTP/FR) OTS price $5.60

Interagency Committee on Oceanography, Washington, D. C.
NATIONAL PLAN FOR OCEAN SURVEYS.
May 63, 47p.
ICO Pamphlet no. 7 Unclassified report

Descriptors: (*Hydrographic surveying, Oceanology), Oceanology, Oceanographic data, Oceanographic vessels.

Contents: Purpose and Objectives of the Plan; The Ocean Survey Plan; Scope and Orientation, Program planning and operations, Areas for investigation, Platforms to be utilized in ocean surveys, Instrumentation, Navigation, Types of investigation, Oceanographic data to be collected, Data processing, Publication of data, Shore facilities and manpower, Ships required, and International cooperation. Appendix I: Oceanographic data to be collected; Appendix II: Tentative ship construction schedule; Appendix III: Ship-time-accomplishment matrix; Appendix IV: Ocean survey program for 1963 season.

AD-412 307 Div. 2, 25
(TISTP/FEM) OTS price $1.10

Sacramento Peak Observatory, Sunspot, N. Mex.
THE SPECTROPHOTOMETRY OF THE INFRARED LINES OF IONIZED CALCIUM LAMBDA 8498, 8542, 8662 IN FLOCCULI PART II. THE GENERAL CHARACTERISTIC PROPERTIES OF INFRARED LINES IN THE SPECTRA OF FLOCCULI AND SPOTS,
by E. R. Mustel and T. T. Tsap, tr. by Alice B. Dunn. 1958, 5p. Solar research note no. 28
AFCRL 63 270 Unclassified report

Trans. from Izvestia Krimskoi Ast. Obs. XX, pp. 74-79, 58.

Descriptors: (*Line spectrum, Infrared spectroscopy), (*Solar spectrum, Sunspots), (*Infrared phenomena, Spectrophotometers), Frequency, Brightness, Absorption, Solar radiation, Spectroscopy, Photometers, Infrared radiation, Telescopes, Solar corona, Spectra (Infrared), Ionization, Calcium.

The general characteristic properties of the infrared triplet in the spectra of flocculi and spots are discussed. The spectra of flocculi were taken with the solar tower telescope of the observatory, with a dispersion of 0.35 A/mm. The photometric study of the spectrograms showed that bright reversals IR(2), similar to the bright reversals H(2) and K(2), and also dark lines IR(3), similar to the lines H(3) and K(3), are observed in the spectra of all sufficiently bright flocculi. The bright reversals IR(2) with the dark lines IR(3) are usually nonsymmetric. More often the bright reversal IR(2) is displaced towards shorter wavelengths, relative to its normal position, and the absorption IR(3) is displaced towards longer wavelengths, relative to this emission. As it is known, this is also observed for the lines H(2) and K(2), H(3), and K(3). The problem of the origin of the IR(3) lines is discussed. A preliminary discussion is given of the spectra of sunspots in the infrared triplet region. (Author)

AD-412 328 Div. 2
(TISTP/FEM) OTS price $9.10

Douglas Aircraft Co., Inc., Long Beach, Calif.
NB-66B HIGH ALTITUDE GUST SURVEY: TIME SERIES.
Final rept.,

by J. A. Strom and T. G. Weathermon. June 63, 192p. Rept. no. LB31236
Contract AF33 616 7647, Proj. 1447
ASD TDR63 145, Vol. 3 Unclassified report

Report on High Level Turbulence.

Descriptors: (*Guists, Velocity), (*Wind, Time), (*Meteorological parameters, Periodic variations), Turbulence, High altitude, Penetration, Thunderstorms, Experimental data, Measurement, Records, Recording paper.

Time series plots for vertical, lateral, forward and derived gust velocities are presented. Time series plots for true airspeed, pressure altitude, outside air temperature and normal acceleration (measured at the radome) for 14 of the more severe penetrations are also presented. (Author)

AD-412 403 Div. 2
(TISTP/RLG) OTS price $4.60

Hawaii Inst. of Geophysics (Honolulu).
TROPICAL CYCLONES OF THE EASTERN NORTH PACIFIC AS REVEALED BY TIROS OBSERVATIONS,
by James C. Sadler. May 63, 39p. Scientific rept. no. 4; Hawaii Institute of Geophysics rept. no. 33
Contract AF19 604 6156, Proj. 6698, Task 669802
AFCRL 63 493 Unclassified report

Descriptors: (*Tropical cyclones, Oceans), (*Meteorological satellites, Photographic analysis), Surface temperatures, Intensity, Meteorology, Shear stresses, Troposphere, Data, Storms, Hurricane tracking, Tropical regions, Photographs, Mapping.

Photographic data from TIROS satellites indicate the frequency of tropical cyclones of tropical storm and hurricane intensity, to be some three times greater than the frequency determined by conventional meteorological data in the eastern North Pacific. The sea surface temperatures exert an influence on the size, intensity and track of the cyclones but the dominant influence which prevents a large number of cyclones from being exported into the central Pacific with hurricane force winds is the ''killing'' effect of extreme vertical shear as the cyclones pass through the upper tropospheric ridge line. TIROS data are presented to illustrate the effects of these influences, separately and in combination, on the life history of eastern Pacific tropical cyclones. (Author)

AD-412 425 Div. 2
(TISTP/RLG) OTS price $2.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
3 July 63, 20p.
AID Report P63 89 Unclassified report

Descriptors: (*Upper atmosphere, Meteorological phenomena), Scientific research, Reviews, Solar radiation, Ionosphere, Ionospheric disturbances, Meteorology, Meteorological parameters, Abstracts.

AD-412 426 Div. 2, 8
(TISTP/FEM) OTS price $1.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
25 July 63, 13p.
AID Report P63 98 Unclassified report

Descriptors: (*Upper atmosphere, Meteorology), (*Ionosphere, Solar radiation), (*Atmospheric electricity, Electric fields), High frequency, Velocity, Atmospheric sounding, Drift, Polarization, Density, Diurnal variations, Ionospheric disturbances, Magnetic storms, Troposphere, Radio waves, Ionization, Recombination reactions, Oxygen, Plasma medium, Ions, Electrons, Protons.

AD-412 427 Div. 2, 5
(TISTM/AM) OTS price $2.60

Aerospace Information Div., Washington, D. C.
UNDERGROUND COMMUNICATIONS. ANNOTATED BIBLIOGRAPHY OF SOVIET-BLOC LITERATURE FOR THE PERIOD 1960-1962.
26 July 63, 19p.
AID Rept. B 63 99 Unclassified report

Descriptors: (*Bibliographies, Geophysics), (*Geophysics, Geophysical prospecting), Electromagnetic fields, Terrain, Theory, Terrestrial magnetism, Resistance (Electrical), Electric current.

This annotated bibliography has been prepared in response to AID Work Assignment No. 37, Task 4. The bibliography covers the period from January 1960 to December 1962. The materials are divided into three groups, each containing information published during one particular year. Within each group the materials are presented alphabetically according to the author's name. Information not directly related to the assigned subject has been included because of its broad implications for study in this field. (Author)

AD-412 446 Div. 2
(TISTP/FEM) OTS price $8.60

Army Map Service, Washington, D. C.
THE APPLICATION OF OCCULTATIONS TO GEODESY,
by S. W. Henriksen. Dec 62, 97p.
AMS TR46 Unclassified report

Descriptors: (*Geodesics, Solar systems), (*Solar eclipses, Geometry), Earth, Moon, Lunar satellites, Orbital trajectories, Earth models, Periodic variations, Stars, Star trackers, Motion, Surveying, Numerical analysis, Light, Propagation, Radio astronomy, Errors, Partial differential equations, Trigonometry.

AD-412 479 Div. 2, 30
(TISTP/JP) OTS price $6.60

Midwest Research Inst., Kansas City, Mo.
LIMITATIONS ON THE ACCURACY OF SONIC THERMOMETERS.
Final rept., 1 May 62-30 Apr 63,
by Paul L. Smith, Jr. 1 June 63, 62p.
Contract AF19 628 473, Proj. 6670; MRI Proj. 2602E, Task no. 667001
AFCRL 63 687 Unclassified report

Descriptors: (*Atmospheric temperature, Measurement), (*Thermometers, Errors), (*Sound transmission, Atmospheric motion), Atmospheric sounding.

The factors that limit the accuracy attainable with acoustic measurements of atmospheric temperatures have been investigated. The factors considered are: (1) variable water vapor content

of the air; (2) motion of the air; (3) inaccuracies in measuring the acoustic path length; (4) inaccuracies in measuring the transit time; (5) turbulence; and (6) nonideal behavior of the gas. Quantitative estimates have been obtained of the importance of each of these factors under various conditions. On the basis of the results of this study, the best accuracy attainable with acoustic measurements of atmospheric temperatures is found to be about 0.5 K. Sonic thermometers using continuous-wave techniques for measuring the transit time, coupled with instrumentation appropriate for providing compensation for any of the above factors causing major errors, will be required. (Author)

AD-412 501 Div. 2
(TISTP/FEM) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
PARAMETRIC FORMULAS FOR GEODESIC CURVES AND DISTANCES ON A SLIGHTLY OBLATE EARTH,
by E. A. Lewis. Apr 63, 37p.
Proj. 4662
AFCRL 63 485 Unclassified report

Descriptors: (*Geodesics, Spheres), Direction finding signals, Very low frequency, Numerical analysis, Geometry, Differential equations, Calculus of variations, Functions, Integrals, Electromagnetic waves, Propagation.

Approximate expressions for geodesic curves and the geodesic arc-lengths are obtained by straightforward methods which permit upper bounds of error to be established analytically. The errors are typically less than 1.4 parts per million, and even higher accuracy is possible with additional corrections. Selected numerical examples are given, and calculated arc-lengths are compared with values obtained with Andoyer's approximate formula. (Author)

AD-412 528 Div. 2, 6
(TISTP/WH) OTS price $1.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 6, 1 Jan-31 Mar 63,
by E. A. Mueller and G. E. Stout. 31 Mar 63, 19p.
Contract DA36 039sc87280, DA Task 3A99 07 001 01
Unclassified report

Descriptors: (*Meteorological radar, Raindrops), (*Raindrops, Meteorological radar), Radioactive fallout, Statistical analysis, Evaporation, Cameras, Experimental data.

Data on raindrop-size distribution in various parts of the world will be correlated with appropriate radar parameters in order to improve the capability of radar in measuring surface rainfall intensities for Army applications such as radioactive rainout prediction, trafficability, and communications. (Author)

AD-412 545 Div. 2
(TISTP/FEM) OTS price $1.60

General Mills, Inc., Minneapolis, Minn.
TIME SECTIONS OF THE ZONAL WINDS AT TROPICAL STATIONS.
Interim progress rept. no. 3, 1 Jan-31 Mar 63 on Tropical Upper Air Studies,
by A. D. Belmont and D. G. Dartt. 1 Apr 63, 11p.
Rept. no. 2383
Contract DA36 039SC89211, Proj. 3A99 27 005 09
Unclassified report

Descriptors: (*Upper atmosphere, Tropical regions), (*Stratosphere, Wind), Meteorology, Meteorological parameters, Air mass analysis, Motion, Troposphere, Radiosondes.

Three additional time sections of the monthly mean upper air winds were prepared for Leopoldville, Eniwetock, and Johnson Island. These graphs confirm the irregularity of the observed zonal wind directions in the tropical stratosphere, and show the complex relationship of the stratospheric to high tropospheric westerlies. (Author)

AD-412 603 Div. 2
(TISTP/FR) OTS price $6.60

Interagency Committee on Oceanography, Washington, D. C.
OCEANOGRAPHY, THE TEN YEARS AHEAD: A LONG RANGE NATIONAL OCEANOGRAPHIC PLAN 1963-1972.
Jun 63, 217p. ICO Pamphlet no. 10,
Unclassified report

Descriptors: (*Oceanology, Scientific research), Scientific research, Research program administration.

Contents: Introduction; National goals in oceanography; Special groups concerned with oceanography; Capabilities and systems to support oceanographic goals; Surveys and services; The international setting; Program summary and evaluation; Organizational problems; and Recent budget summaries-national oceanographic program.

AD-412 686 Div. 2
(TISTB/WA) OTS price $4.60

Texas A. and M. Coll., College Station.
A MORPHOMETRIC STUDY OF SEASONAL CONCENTRATIONS OF THE SAILFISH, ISTIOPHORUS ALBICANS IN THE NORTHERN GULF OF MEXICO, WITH NOTES ON OTHER GULF ISTIOPHORIDS,
by Norman G. Vick. 15 May 63, 41p. Reference no. 63 14T
Contract Nonr21194, Projs. NR083 036; 286D
Unclassified report

Descriptors: (*Marine biology, Fishes), Morphology (Biology), Anatomy, Body weight.

The various parts of the body of the Atlantic sailfish, I. albicans, grow at different rates throughout their life history so that the ratio of one dimension to another is not constant. The selection over the extremes of the range or morphometric characters for comparison of geographically remote stocks must be considered from many standpoints with special attention to sampling selectivity and growth related character changes. Statistical analysis of allometric growth features typically has been restricted to values near the mean body length. Schaefer (1952) cautioned that a particular equation thus obtained may not be representative when the range is extended. (Author)

AD-412 744 Div. 2, 30
(TISTP/FR) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
RADIANCE OF THE UPPER ATMOSPHERE IN THE MIDDLE ULTRAVIOLET,
by R. M. Friedman, R. D. Rawcliffe and G. E. Meloy. 26 July 63, 11p. TDR169 3260 50TN4
Contract AF04 695 169
Unclassified report

Descriptors: (*Ultraviolet radiation, Atmosphere), Atmosphere, Solar radiation, Scattering, Radiometers, Satellites (Artificial).

Solar irradiance scattered from the earth's atmosphere was measured in the middle ultraviolet from an Air Force satellite launched in July 1962. The radiometer filter defined a wavelength region centered at 2550A with a bandpass at half-maximum of about 140A. The effective field of view was 1.2 x 10 to the -4 sterad. Due to the late afternoon launch, the minimum angle between the sun direction and the local zenith at the satellite during the flight was 49 deg. The radiance values reached a maximum at these positions and decreased as the vehicle moved toward the shadow region. The maximum radiance value measured was 2.0 ± 0.3 x 10 to the -9 w/sq cm -sterad-A. No signal was observed when the vehicle passed over the dark side of the earth. The results compare well with recent theoretical calculations and other experimental measurements. (Author)

AD-412 745 Div. 2
(TISTP/FEM) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
A METHOD TO FORECAST THE SUNSET VISIBILITY DURING THE WINTER AT RAF WOODBRIDGE,
by Edward D. Heath, Robert D. Grande and D. Stripling. Mar 63, 5p.
Unclassified report

Descriptors: (*Visibility, Mathematical prediction), (*Weather forecasting, Meteorological parameters), Data, Wind, Velocity, Cloud cover, Temperature, Wind direction indicators, Atomsphere motion, Atmosphere temperature, Flight, Aviation safety.

AD-412 757 Div. 2
(TISTP/FR) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
FORECAST STUDY FOR MYRTLE BEACH AIR FORCE BASE. FOG STUDY,
by August A. Hanson, Jr. Rev. 31 May 63, 9p.
Unclassified report

Descriptors: (*Fog, Weather forecasting), Weather forecasting, Airports, Air force operations, Wind, Humidity.

An objective method for forecasting fog at Myrtle Beach Air Force Base, South Carolina is given. The forecasting of late fall through early spring fog at Myrtle Beach was investigated and an objective method for forecasting formation of fog at this base was developed. Although each method has been tested on independent data, actual on-the-spot evaluation will also be conducted during the fog season. (Author)

AD-412 803 Div. 2
(TISTP/WA) OTS price $10.50

Air Force Cambridge Research Labs., Bedford, Mass.
STUDIES IN RADIO ASTRONOMY AND SPACE PHYSICS.
Apr 63, 134p.
AF Projs. 4643 and 5629
AFCRL 63 464 Unclassified report

Descriptors: (*Astronomy, Scientific research), Radio astronomy, Astronomical data, Magnetic storms, Scientific satellites, Scattering, Radio waves, Solar corona, Reports, Air force research, Aurorae, Space environmental conditions, Moon, Reflection, Nebulae, Magnetic storms, Solar disturbances, Antennas, Measurements, Ultra high frequency, Microwaves, Hydrogen, Galaxies, Meteorological radar.

A series of notes is presented on radio astronomy and radio astronomical studies of the atmosphere. The experimental work was performed at the Sagemore Hill Radio Observatory of the Air Force Cambridge Research Laboratories. The first series of papers is on solar studies, including occultation of Taurus by the solar corona and comparative studies of solar radiation in the decimeter radio-frequency range. Atmospheric studies range from electron content variations during a magnetic storm (lunar reflection experiments) to geometric control of satellite scintillations and atmospheric attenuation through the atmosphere at 3 cm. Riometer observations of the effects of the July 9, 1962 nuclear detonation and of the November 1960 flares are presented. Several notes are concerned with ionospheric and tropospheric scintillations including studies of scintillations of radio stars at low angles of elevation, the onset of radio star scintillations with the commencement of magnetic disturbances, and theoretical considerations of scintillation. Diverse work includes effects of terrain on antenna patterns and a summary of two years of observations of auroral reflections and backscatter from a 19-Mcps radar. (Author)

AD-412 809 Div. 2, 25
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CAUSES FOR THE LUMINESCENCE OF ROCKS ON THE MOON,
by N. S. Beskrovnyy. 19 June 63, 3p.
FTD TT63 508 Unclassified report

Trans. from Priroda, No. 12, p. 100, 1962.

Descriptors: (*Moon, Rocks (Geology)), (*Rocks (Geology), Moon), Ultraviolet radiation, Luminescence, Extraterrestrial topology.

AD-412 817 Div. 2
(TISTP/FEM) OTS price $1.60

Hawaii Inst. of Geophysics, Honolulu.
THE HAWAII SOLAR FLARE PATROL.
Final rept.,
by Walter R. Steiger. 11 Apr 63, 5p. Rept. no. 32
Contract AF19 604 2292, Proj. 7649, Task 76494
AFCRL 63 470 Unclassified report

Descriptors: (*Solar flares, Monitors), (*Scientific research, Solar systems), Geophysics, Site selection, Cloud cover, Solar radiation, Sunspots, Photographic recording systems, Optical filters, Hydrogen, Line spectrum, Sky brightness, Solar atmosphere, Solar corona, Photographic analysis.

The Hawaii Solar Flare Patrol was established in 1957 by the University of Hawaii as part of the IGY Solar Activity program. The location in Hawaii provided important coverage in the large Pacific gap. The observatory was at Makapuu Point, Oahu, about 14 miles from the University. Sky conditions were such that observations were made on about 60% of the scheduled observing hours during 1957 to 1962. The flare patrol in-

strument consisted of a fixed telescope inside the building with the solar beam directed to it by a heliostat. The sun was photographed normally every two minutes through an H alpha filter of 1/2A band pass. The films were measured daily and all flares reported immediately to the World Warning Agency and on a monthly basis to the IGY World Data Centers. (Author)

AD-412 853 Div. 2, 25
(TISTM/TCG) OTS price $3.60

Battelle Memorial Inst., Columbus, Ohio.
AN APPROXIMATION OF THE INTEGRATED INFRARED STARLIGHT AT 2.2 MU AND 3.6 MU OVER THE SKY,
by James N. Hanson. 10 Dec 62, 32p. Rept. no. BAT 197 9 1
Contract SD 80, ARPA Order 197
Unclassified report

Descriptors: (*Stars, Infrared radiation), (*Sky brightness, Infrared radiation), (*Infrared radiation, Stars), (*Solar corona, Line spectrum), Galaxies, Colors, K band, L band, Infrared photography, Luminescence, Intensity, Astronomical data.

The integrated starlight for the whole sky has been computed for Johnson's K- and L-bands, centered at 2.2 and 3.6 microns, respectively, from Charlier's compilation of the Henry Draper Catalogue. Isophotes for the K- and L-bands are shown on Aitoff diagrams for both galactic and equatorial coordinates. An analysis of the error of these computations is offered. (Author)

AD-412 866 Div. 2
(TISTP/MFA) OTS price $4.60

Meteorology International, Inc., Monterey, Calif.
A DIAGNOSTIC-CYCLE ROUTINE.
Final rept.,
by Manfred M. Holl. Feb 63, 37p.
Contract Cwb10314
Unclassified report

Descriptors: (*Meteorological parameters, Analysis), Numerical analysis, Atmosphere, Cyclic rate, Pattern recognition, Fourier analysis, Wind, Clouds, Weather communications, Transformations (Mathematics), Equations-of-state, Sequences, Temperature, Pressure, Time, Mathematical prediction.

A 'diagnostic-cycle routine' is designed for the numerical processing of information relating to the atmosphere's evolution, in twelve-hour periods defined by successive collections of synoptic upper-air observations. The routine is applied in terms of one or more selected isentropic surfaces, and, for each surface, consists of: (1) inferring the evolution of required state parameters, (2) evolving the distribution of horizontal velocity as forced by the inferred evolution of the pressure-gradient force, and (3) evolving the distribution of concurrent horizontal parcel-displacement, and calculating the corresponding net vertical displacement of air parcels as terminally distributed in the surface. The method of evolving the horizontal velocity is of fundamental significance in the application of the quasi-static equations system (i.e. the primitive equations) to analysis and prediction. The routine directs available information into the evolution of the velocity in order to achieve accuracy in the rotational and divergent components, and includes an evaluation of the dynamical consistency with the concurrent state-parameter tendency. The interpolation of the state-parameter distributions, between analyses successive in time, is to be accomplished by combining the concept of a steering flow with a technique for scale-and-pattern decomposition. (Author)

AD-412 868 Div. 2
(TISTP/FR) OTS price $8.60

Marine Lab., U. of Miami, Coral Gables, Fla.
A REPORT OF DATA OBTAINED IN FLORIDA STRAITS AND OFF THE WEST COAST OF FLORIDA, JULY - DECEMBER 1962.
May 63, 1v. Rept. no. 63 3; 8260; ML63292
Contract Nonr84001
Unclassified report

Descriptors: (*Oceanographic data), Bathythermograph data, Temperature, Salinity, Density, Oxygen.

The data presented were collected during the last half of 1962 on eight cruises with the R/V Gerda and seven cruises with the M/V Miss Fleta in Florida Straits and the eastern part of the Gulf of Mexico. The data were obtained for studies of the oceanogrphic conditions prevailing in Florida Straits and adjacent waters, with particular regard to the kinematics of the water movements and also to the physical environment of the shrimp population inhabiting the region of the Tortugas Shelf. The tracks of the vessels and the positions at which observations were made are shown in charts immediately preceding the list of oceanographic station data relating to each cruise. (Author)

AD-412 911 Div. 2
(TISTP/FR) OTS price $1.60

Emmanuel Coll., Research Language Center, Boston, Mass.
DIURNAL TEMPERATURE VARIATIONS IN THE STRATOSPHERE (Osutochnom khode temperatury v stratosfere),
by L. A. Biriukova and V. G. Kastrov. 1962, 15p.
Contract AF19 604 8505
AFCRL ETR63 2 Unclassified report

Trans. from Meteorologiia i Gidrologiia, No. 8, pp. 3-10, 1961.

Descriptors: (*Stratosphere, Temperature), Temperature, Diurnal variations, Ozone, Water vapor, Dust, Absorption.

A theoretical investigation of the diurnal temperature variation in the stratosphere was made, supplemented with proper calculations. In addition, only the radiation factors were taken into account since it has been accepted that other factors at these heights are secondary. (Author)

AD-412 912 Div. 2
(TISTP/FEM) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
A STATISTICAL EXPERIMENT IN DYNAMICAL PREDICTION OF THE 24-HOUR SEA-LEVEL PRESSURE CHANGE.
Master's thesis,
by Donald J. Reilly. 1963, 32p.
Unclassified report

Descriptors: (*Barometric pressure, Models (Simulations)), (*Meteorological parameters, Numerical analysis), Mathematical prediction, Statistical processes, Experimental data, Periodic variations, Air mass analysis, Atmosphere motion, Equations, Statistical analysis, Weather forecasting, Numerical methods and procedures, Digital computers, Programming languages, Integral equations.

Two statistical prediction models for the 24-hour surface pressure change are developed. One model employs the terms in a dynamic model as the independent variables in a linear regression equation. The other model combines these variables with parameters capable of reflecting the long-wave, long-term influences in a multivariate discriminate analysis. The regression equations were developed from data taken from the month of November 1962 at 50N latitude. A discussion of the results of both methods is presented along with a critique of the procedures used in obtaining the data. (Author)

AD-412 913 Div. 2, 15
(TISTP/MFA) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
NUMERICAL PREDICTION OF PLANETARY-SCALE WAVES.
Master's thesis,
by Noel Temple Wood. 1963, 24p.
Unclassified report

Descriptors: (*Meteorology, Numerical analysis), (*Mathematical model, Weather forecasting), (*Wave transmission, Atmosphere), Barometric pressure, Vortices, Thermodynamics, Equations, Stability, Difference equations, Fourier analysis, Programming (Computers).

Current numerical barotropic and baroclinic forecasting models have shown an inability to correctly represent the behavior of the planetary-scale waves. A mathematical model, based on the thermodynamic energy equation, has been proposed by Wiin-Nielsen as a means of predicting the behavior of the planetary-scale waves. The model is programmed for the Control Data Corporation 1604 digital computer to utilize the operational output of machine-processed data and analyses produced by the U. S. Navy Fleet Numerical Weather Facility (FNWF), Monterey, California. The present form of the program yields a 1-hr planetary-scale forecast at 1000 mb, 850 mb, 700 mb, 500 mb and 300 mb in ten minutes. (Author)

AD-412 914 Div. 2
(TISTP/FEM) OTS price $4.60

Naval Postgraduate School, Monterey, Calif.
A STATISTICAL EXAMINATION OF THE 500-MB 48-HR PROGNOSES PREPARED BY FLEET NUMERICAL WEATHER FACILITY, MONTEREY, CALIFORNIA,
by Roger W. Kelly and Frank C. Nelson, Jr.
1963, 37p.
Unclassified report

Descriptors: (*Barometric pressure, Mathematical prediction), (*Weather forecasting, Statistical processes), (*Statistical analysis, Meteorological parameters), Data, Data processing systems, Digital computers, Fourier analysis, Periodic variations, Phase shifters.

The Fleet Numerical Facility (FNWF) 500-mb long-wave prognoses at latitudes 20N through 70N were analyzed statistically for possible error-bias. FNWF issued a correction field (verified minus prognostic) for each latitude circle and day under study as well as the initial height field 48 hours earlier. Fourier analyses of both the correction fields and the initial height fields were made. Spectral analyses of the correction fields indicated that more than 60% of the error lay in correction-waves 1, 2, and 3 at all latitudes and that this figure increased northward. The question of stabilization of the ultra-long waves (1, 2, and 3), using the present operational barotropic model is investigated. The model seems to retard waves 1 and 3 at the lower and middle latitudes, and to move them too far at high latitudes. The results for wave 2 are somewhat less conclusive, but are generally in agreement with those for waves 1 and 3. (Author)

AD-412 923 Div. 2
(TISTP/FEM) OTS price $7.60

Barkley and Dexter Labs., Inc., Boston, Mass.
RESEARCH INTO GRAVITY MEASURING TECHNIQUES.
Final rept.
Mar 63, 56p.
Contract AF19 604 7220, Proj. 7600, Task 760007
AFCRL Rept. no. 63 665
Unclassified report

Descriptors: (*Gravity, Measurement), (*Instrumentation, Gravity), Meters, Optimization, Experimental data, Tests, Recording systems, Analysis, Tables, Electrical networks, Electronic equipment, Vacuum, Optical equipment.

The use and description of two AFCRL relative gravity bi-pendulum apparatus are discussed. Operating instructions and details of data acquisition and reduction are also presented. Modifications and improvements to the equipment are described, and an evaluation is given. Several gravimeters, used as support equipment or as subjects for evaluation, are also described. (Author)

AD-412 932 Div. 2, 25
(TISTP/WH) OTS price $5.60

Aerospace Information Div., Washington, D. C.
LUNAR DIMENSIONS ANNOTATED BIBLIOGRAPHY OF SOVIET-BLOC LITERATURE.
30 July 63, 49p.
AID Rept. B63 100 Unclassified report

Descriptors: (*Bibliography, Moon), (*Moon, Extraterrestrial topography), Lunar environment, Measurement, Astronomical observatories, Geodesics.

An annotated bibliography is presented of Soviet-bloc research on lunar dimensions. Based on open-source materials available at the Library of Congress, the bibliography reflects Soviet developments from 1957 to 1963 in investigating lunar revolution, rotation, libration, and mapping techniques. The entries are arranged alphabetically by author. Titles of Soviet monographs are given in transliteration, followed by an English translation. (Author)

AD-412 950 Div. 2, 30
(TISTP/FR) OTS price $1.60

Geophysical Inst., U. of Alaska, College.
STUDY OF THE ARCTIC IONOSPHERE BY MEANS OF STEP-FREQUENCY BACKSCATTER SOUNDING.
Final rept.,
by Howard F. Bates. June 63, 11p.
Contract AF19 628 440
AFCRL 63 184 Unclassified report

Descriptors: (*Atmospheric sounding, Instrumentation), Scattering, Radar echo areas, Ionosphere, Ionospheric disturbances.

A Granger step-sounder was installed and operated in the backscatter mode at College, Alaska. Preliminary results indicate that direct backscatter echoes from the E and F regions predominate when sounding north. A southerly motion of

radio auroral echoes as sunset approaches, similar to that observed optically, is reported. Future plans are discussed for a combined forward and backscatter sounding program. (Author)

AD-413 001 Div. 2, 25
(TISTP/WH) OTS price $1.10

Sacramento Peak Observatory, Sunspot, N. Mex.
THE DETERMINATION OF THE OPTICAL DEPTH OF GRAINS OF CONTINUOUS EMISSION IN SOLAR FACULAE,
by V. L. Khokhlova, tr. by A. B. Dunn. 1963, 8p.
AFCRL Solar research note no. 27, AFCRL 63 269
Unclassified report

Trans. from Iz. Krim. Ast. Obs. XIX, pp. 115-125, 1958.

Descriptors: (*Astronomical observatories, Sun), (*Solar spectrum, Spectrum analyzers), Calcium, Ions, Solar atmosphere, Spectra (Visible and ultraviolet), Emissivity, Continuous spectrum, Brightness.

The weakening of continuous emission in the wings of strong H and K lines of Ca+ was used for determining the optical depth (in the frequency of the continuous spectrum) of the grains of continuous emission. For 7 investigated grains it was found to vary from tau =0 to tau =1.0. It is shown that the rise and fall in the wings of H and K in the grains in comparison to the undisturbed photosphere can be explained by the influence of continuous emission at different depths. (Author)

AD-413 009 Div. 2, 32
(TISTP/WH) OTS price $23.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TO THE NEAR AND DISTANT UNIVERSE (DO BLIZKEHO I VZDALENEHO VESMIRU).
16 July 63, 442p.
FTD TT62 7
Unclassified report

Trans. from Rozhlasova Universita, Praha Orbis, 1960, pp. 1-328.

Descriptors: (*Textbooks, Astronomy), (*Astronomy, Textbooks), Moon, Planets, Stars, Solar system, Space flight, Interstellar matter.

AD-413 016 Div. 2
(TISTP/JP) OTS price $1.60

Ankara U., Turkey.
RESEARCH ON METEORIC DUST FALL OUT.
Annual summary rept. no. 1, 1 May 62-30 Apr 63,
by E. A. Kreiken. 1963, 13p.
Contract AF61 052 624
AFCRL 63 824 Unclassified report

Descriptors: (*Meteorites, Dust), Measurement, Counting methods.

Starting May 1st 1962 every day the number of particles of meteoric dust falling on a plate of 60 x 60 cm and also on a plate of 40 x 40 cm was counted. Not only were the numbers of particles counted, but also the dimensions of each particle were measured. The particles not only differ in size but also in shape. As yet it cannot be said whether or not these differences in shape have any significance. Only by continuous observation and by a subsequent statistical discussion will it later on be possible to clarify this point. Up till now about 40,000 different particles have been measured of which the dimensions range from around 10 micron to 100 micron. Some particles are visible even by the naked eye. The particles are collected with the help of an electromagnet. Therefore it is obvious that only the ''rest masses'' of iron meteorites are collected. Consequently, also all discussions concerning the observed particles exclusively apply to iron meteorites. (Author)

AD-413 041 Div. 2
(TISTP/FR) OTS price $5.60

Texas A and M Coll., College Station.
OCEANOGRAPHY AND METEOROLOGY OF THE GULF OF MEXICO.
Annual rept., 1 May 62-30 Apr 63,
by Hugh J. McLellan. 15 July 63, 62p.
Contract Nonr211904, Proj. NR083036
Unclassified report

Descriptors: (*Oceanology, Scientific research), Ocean currents, Ocean bottom, Seismic waves, Sea water, Chemical analysis, Sampling, Temperature, Tropical cyclones, Instrumentation.

Contents:
Yucatan Current
Investigation of the currents and waters off Northeastern Brazil
Seasonal variation of the Atlantic Trade Wind Regimes
Seismic refraction studies
Environmental studies off Panama City, Florida
Geological Oceanography
Chemical oceanography and geochemistry
- Radiocarbon dating of sea water
- Lipids in sea water
- Distribution of Mg, Ca, Ba, and Sr, in sea water

Currents and water masses in the Gulf of Mexico
Sampling organic structures in tidal flat deposits
Modification of water temperatures by Hurricane ''Carla''
Instrumentation

AD-413 047 Div. 2
(TISTP/FEM) OTS price $1.10

Sacramento State Coll., Calif.
THE SPECTROPHOTOMETRY OF LINES IN GRAINS OF CONTINUOUS EMISSION,
by A. B. Severny and V. L. Khoklova, Tr. by Alice B. Dunn. 1963, 7p.
AFCRL Solar research note no. 31; AFCRL 63 273
Unclassified report

Descriptors: (*Spectrophotometers, Line spectrum), (*Solar spectrum, Solar radiation), Ions, Photometers, Analysis, Microphotometers, Data, Emissitivity, Frequency, Tables, Brightness.

A spectrophotometric reduction of lines of neutral elements and some ions in the spectrum of grains of continuous emission was carried out. No noticeable difference between the behaviour of the neutral atoms and ions in the spectrum of the grain was noted. It is shown that the difference between the lines of the grain spectrum and those in the spectrum of undisturbed regions is explained satisfactorily when assuming the grains being optically thin formations localized at optical depths (in frequencies of the continuous spectrum) from tau= 0 to tau approximately equal to 1. It is shown that the results of investigations of faculae cannot be explained by the averaging of the effect observed in the grains of continuous emission. (Author)

AD-413 049 Div. 2
(TISTP/FEM) OTS price $4.60

Travelers Research Center Inc., Hartford, Conn.
AN EVALUATION OF 2-7-HR AVIATION THERMINAL-FORECASTING TECHNIQUES.
Interim rept.,
by Isadore Enger, Lawrence J. Reed and James E. MacMonegle. Oct 62, 27p. Technical pub. no. 20
Contract FAA BRD363, Proj. 204 1
Unclassified report

Descriptors: (*Weather forecasting, Reliability), (*Probability, Weather forecasting), Tests, Analysis, Climatology, Visibility, Cloud cover, Statistical analysis, Data processing systems, Mathematical production, Ceiling, Time.

An evaluation of short-period (2-7-hr) ceiling and visibility terminal forecasting techniques indicates that it is possible to prepare objective forecasts of these critical aviation weather parameters which yield a statistically significant improvement over those presently provided in routine operations. Two types of forecasts were examined: probability forecasts and categorical forecasts. (Author)

AD-413 058 Div. 2
(TISTP/FEM) OTS price $2.60

International Meteorological Inst. (Sweden).
RESEARCH IN NUMERICAL ANALYSIS AND FORECASTING.
Technical rept., (Final).
May 63, 22p.
Contract AF61 052 346
AFCRL 63 826 Unclassified report

Descriptors: (*Weather forecasting, Numerical analysis), (*Atmospheric motion, Shear stresses), (*Wind, Friction), Troposphere, Weather stations, Data, Meteorological charts, Analysis, Errors, Surface temperature, Barometric pressure, Drag, Viscosity, Heating, Atmospheric tides, Gas flow, Air.

Observational data have been used in studies of friction and frictional dissipation in the atmosphere. Data from aerological stations in southern U.S. during suitable weather conditions were used for vertical integration in the equations of motion in order to determine stresses in the lowest two kilometers of the atmosphere. Data from the dense radio-wind network over the British Isles were used in order to study the frictional dissipation within a limited area and to determine characteristic values for the cross isobaric angle, for the ratio of the wind at aneomometer level and geostrophic surface wind, for the geostrophic drag coefficient and for the eddy viscocity in their dependence of surface roughness. On the assumption that zonal averages of third order perturbation quantities can be neglected, it is shown that one can derive a complete set of equations for prediction in barotropic flow. It is shown that a considerable simplification can be obtained if one considers a quasi linearized system, which with regard to the statistical quantities is equivalent to the first system. (Author)

AD-413 067 Div. 2
(TISTP/FEM) OTS price $2.60

Sacramento Peak Observatory, Sunspot, N. Mex.
A STUDY OF EMISSION BROADENING IN STRONG LINES OF FLARES AND MOUSTACHES,
by A. B. Severny and A. N. Koval, tr. by Alice B. Dunn. 1961, 28p. Solar research note no. 29
AFCRL 63 271 Unclassified report

Trans. from Izvestia Krimskoi Ast. Obs. vol. 26, pp. 3-40, 1961.

Descriptors: (*Solar flares, Emissivity), (*Line spectrum, Solar radiation), Solar atmosphere, Spectroscopy, Hydrogen, Doppler effect, Motion, Velocity, Images, Brightness, Helium, Solar corona.

The profiles of emission wings in moustaches and surge-flares above the limb are analyzed. It is found that emission distribution in wings of moustaches and surge-flares above the limb cannot be explained by the Stark effect, although in the cores of strong hydrogen lines this effect can play a noticeable role. (Author)

AD-413 082 Div. 2
(TISTP/JP) OTS price $4.60

Allied Research Associates, Inc., Concord, Mass.
TERRESTRIAL FEATURES OF THE UNITED STATES AS VIEWED BY TIROS,
by John F. Cronin. 1 July 63, 35p. ARA T 9219 4; Scientific rept. no. 2
Contract AF19 628 2471 Proj. 6698, Task 669802
AFCRL Rept. no. 63 664 Unclassified report

Descriptors: (*Photographic reconnaissance, Meteorological satellites), Meteorological charts.

The photography of the TIROS meteorological satellite series is providing the first continuous view, from outside the atmosphere, of the earth's surface and its cloud masses. To assist in the problems of identification, due to the similarity of many clouds to certain terrestrial features, a map has been compiled portraying the United States as its surface features appear in TIROS photography. The ground patterns are those of late winter and early spring (February-April). This report, which is to accompany the map, is a compilation of photographs illustrating selected geographical features shown on the map or noted during its preparation, with descriptive comments on the nature of these features and why they are visible in the TIROS pictures. (Author)

AD-413 084 Div. 2, 25
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF ATMOSPHERIC TURBIDITY IN VARIOUS DIRECTIONS BY POLARIMETRY,
by D. G. Stamov. 27 June 63, 17p.
FTD TT63 536 Unclassified report

Trans. from Aktinometriya I Atmospernaya Optika, (Trudy), Gidrometeorologicheskoye izdatel'stvo, Leningrad, pp. 115-124, 1961.

Descriptors: (*Atmospheric motion, Turbulence), (*Turbulence, Measurement), Polarization, Equations, Azimuth, Instrumentation, Determination.

AD-413 088 Div. 2
(TISTP/FEM) OTS price $3.60

Uppsala U. (Sweden).
COSMIC RAY INTENSITY VARIATIONS DURING 1962,
by A. E. Sandstrom, E. Dyring, L. Ekstrom, B. O. Gronkvist and S. Lindgren. 25 Apr 63, 26p.
Technical note no. 1
Contract AF61 052 614
AFCRL 63 681 Unclassified report

Descriptors: (*Cosmic ray bursts, Intensity), (*Cosmic rays, Diurnal variations), Geophysics, Cosmic ray telescopes, Neutron counters, Phase studies, Phase shifters, Atmospheric refraction, Absorption, Meteorological phenomena, Barometric pressure, Tables.

A detailed account is given of the diurnal and semidiurnal variation recorded in Uppsala and Kiruna by a neutron monitor, two cubical telescopes and six inclined telescopes. Six decreases that took place are illustrated by bihourly diagrams. The diurnal variation is illustrated by a number of vector sum diagrams for sun rotation periods. For the diurnal variation recorded by part of our instruments a rather abrupt phase shift to later hours seems to have occurred in the autumn. (Author)

AD-413 094 Div. 2
(TISTP/FEM) OTS price $4.60

Travelers Research Center Inc., Hartford, Conn.
THE USE OF RADIOSONDE OBSERVATIONS TO DIAGNOSE CLOUD AMOUNT IN LAYERS,
by John T. Ball. Dec 62, 42p. 7044 47; TP24
Contract FAA BRD363
Unclassified report

Descriptors: (*Cloud cover, Analysis), (*Radiosondes, Cloud height indicators), (*Meteorological parameters, Weather forecasting), Thickness, Clouds, Moisture, Humidity, Dew point, Temperature, Data processing systems.

Radiosonde observations are studied as a means for diagnosing cloud amount in layers as a supplement to airways observations used in objective analysis of clouds. The data used here consist of 1500Z cloud and radiosonde observations taken between Jan 1, 1949, and May 31, 1957, at 10 stations in the eastern United States. Five hundred cases were processed at each station, with the atmosphere divided into 3 layers. For each layer, a dependent variable (cloud amount) and between 29 and 33 independent variables (moisture, stability, and flow parameters) were computed. The entire set of specifiers (independent variables) was examined for correlation with cloud amount, with the aid of a forward screening procedure which selects from the entire set a limited number of independent variables, each one of which contributes significantly and independently toward explaining the variance of the dependent variable. Multiple linear-regression equations were then obtained relating cloud amount to the selected diagnostic variables. (Author)

AD-413 115 Div. 2, 1
(TISTP/FEM) OTS price $19.75

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING. TECHNIQUE DEVELOPMENT PROGRAM.
Status rept.
30 Sep 61, 1v.
Contract FAA BRD363 Unclassified report

Descriptors: (*Meteorology, Data processing systems), (*Data processing systems, Weather forecasting), (*Aviation safety, Flight paths), Terminal flight facilities, Weather stations, Automation, Computers, Programming (Computers), Air mass analysis, Cloud cover, Visibility, Weather communications, Turbulence, Wind, Velocity, Probability, Mathematical prediction, Cloud height indicators, Meteorological phenomena, Meteorological radar.

Research, development and testing of an automatic weather data processing subsystem are discussed. The plan is to develop and test integrated automatic data processing technique packages which are designed to serve specific requirements of the Common Aviation Weather System. Component techniques which will comprise these technique packages for automated weather analysis, prediction, and weather data handling are being developed and tested as the first stage of the program. (Author)

AD-413 129 Div. 2, 20, 16
(TISTA/AMS) OTS price $6.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATION ENVIRONMENTAL EXPERIMENT,
by J. H. Rowland, J. C. Bakke, W. L. Imhof and R. V. Smith. June 63, 61p.
Contract AF04 695 23, Proj. 6770
SSD TDR 63 149 Unclassified report

Descriptors: (*Space environmental conditions, Radiation effects), (*Radiation effects, Space environmental conditions), Electrons, Protons, Experimental data, Space probes, Space flight, Space medicine, Spacecraft, Design, Van Allen radiation belt, Radiation damage, Radiation hazards, Radioactive fallout, Shielding.

This report summarizes the development, testing, calibration and flight of a Radiation Environmental Experiment, including reduction and analysis of the data gathered from two essentially identical sets of four instruments flown on two Atlas Scientific Passenger Pods in December 1962 and March 1963. Integral proton fluxes for energies greater than 59, 95, and 148 Mev are given, and angular distributions and energy spectra are presented for protons in the energy range 12 to 95 Mev and for electrons in the energy range 0.15 to 1.8 Mev. (Author)

AD-413 133 Div. 2
(TISTM/AMS) OTS price $9.60

Naval Ordnance Test Station, China Lake, Calif.
A STATISTICAL STUDY OF TEMPERATURES ALOFT OVER THE U. S. NAVAL ORDNANCE TEST STATION,
by Paul H. Miller. Apr 63, 114p.
NAVWEPS Rept. 8108; NOTS TP3176
Unclassified report

Descriptors: (*Atmospheric temperature, Upper atmosphere), Climatology, Data, Statistical data, Atmosphere models, Rocket research.

Climatological values of free air temperature between the levels of 15,000 and 100,000 ft/m.s.l. at the Naval Ordnance Test Station, are presented in 5,000-ft increments. Frequency distributions have been established for monthly, seasonal, and annual reference periods as well as for predetermined altitudes. These statistics are based on the data taken during the period 1 January 1955 through 31 December 1962. Deviations of the NOTS data from the 1959 Air Research and Development Command (ARDC) Model Atmosphere are given. (Author)

AD-413 155 Div. 2, 19
(TISTA/LSK) OTS price $3.60

Federal Aviation Agency, Washington, D. C.
COMMON AVIATION WEATHER SYSTEM DEVELOPMENT PROGRAM.
Aug 63, 32p.
Unclassified report

Descriptors: (*Weather forecasting, All-weather aviation), (*All-weather aviation, Weather communications), Air traffic, Air traffic controllers, Air traffic control systems, Aviation safety, Civil aviation.

The FAA is developing the Common Aviation Weather System to provide needed weather information to all user segments - civil and military airspace users, and air traffic controllers. The information needed by all airspace users has been determined and translated into system performance requirements. System design is proceeding in order to satisfy these performance requirements. To assure speedy system development and implementation, research, system design, equipment design, and test and experimentation efforts are being conducted in parallel- but always within bounds set by requirements and over-all system design work. The result of this integrated effort will be an aviation weather system that will satisfy user needs at minimum cost yet furnish service far surpassing that available today - service which is designed specifically for the user; providing products that the user can readily understand and that he can apply directly to his aviation operations. (Author)

AD-413 166 Div. 2, 1, 9
(TISTA/GEC) OTS price $6.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
NB-66B HIGH ALTITUDE GUST SURVEY. VOLUME II. POWER SPECTRA.
Final rept.,
by J. A. Strom and T. G. Weathermon. June 63, 435p.
Contract AF33 616 7647, Proj. 1447
ASD TDR63 145, V2 Unclassified report

Descriptors: (*Gusts, High altitude), (*Meteorology, Turbulence), Thunderstorms, Wind, Jet bombers, Velocity, Penetration.

Volume II contains the power spectra plots for vertical, lateral and forward gust velocities corrected for airplane motion, followed by the power spectra plots of uncorrected vertical and uncorrected lateral gust velocities. The data presented were obtained from 109 high altitude storm penetrations in which the length of runs varied up to 240 seconds. The data were sampled 25 times per second and the autocorrelation function was computed for 125 phase shifts. (Author)

AD-413 270 Div. 2
(TISTP/FEM) OTS price $4.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
NB-66B HIGH ALTITUDE GUST SURVEY: TECHNICAL ANALYSIS.
Final rept.,
by J. A. Strom and T. G. Weathermon. June 63, 259p.
Contract AF33 616 7647, Proj. 1447
ASD TDR63 145, vol. 1 Unclassified report

Report on High Level Turbulence.

Descriptors: (*Storms, Experimental data), (*Wind, Velocity), (*Thunderstorms, Aircraft), (*Gusts, Meteorological parameters), High altitude, Penetration, Meteorological phenomena, Meteorological instruments, Meteorological radar, Turbulence, Data, Instrumentation.

Introductory and explanatory information are given pertaining to the quantitative data gathered with a gust measuring NB-66B aircraft during high altitude storm penetrations made as a part of the 1961 National Severe Storms Project. The data presented include power spectrum plots of the three axes gust velocities and frequency distributions of the peaks. (Author)

AD-413 311 Div. 2, 1
(TISTA/LSK) OTS price $22.25

Denver Research Inst., Colo.
BALLOON FLIGHT OF AUGUST 28, 1962.
Flight data rept. no. 9,
by David G. Murcray, James N. Brooks, Jay O. Green, and Marie M. Working. 19 July 63, 419p.
Contract AF33 616 7633
Unclassified report

Descriptors: (*Balloons, Flight), (*Balloon equipment), Automatic, Solar radiation, Infrared, Background, Ultraviolet radiation, Indium alloys, Antimony alloys, Programming (Computers), Instrumentation, Liquefied gases, Oxygen, Cooling, Tables.

This report presents the results obtained on a balloon flight made with an automatic programmed radiometer system. The equipment was launched from Holloman Air Force Base, New Mexico, August 28, 1962. The radiometer was equipped with a liquid oxygen cooled InSb cell as a detector and measurements were made of the infrared background radiation in various wavelength intervals between 1.8 to 5.0 microns. (Author)

AD-413 326 Div. 2, 25
(TISTP/FEM) OTS price $4.60

California U., Los Angeles.
PHOTOELECTRIC SKYLIGHT POLARIMETER,
by C. R. Nagaraja and Z. Sekera. June 63, 43p.
Scientific rept. no. 1
Contract AF19 604 8050, Proj. 7621, Task 762103
AFCRL Rept. no. 63 809
Unclassified report

Descriptors: (*Sky brightness, Polarization), (*Polariscopes, Solar radiation), Optical phenomena, Atmospheric refraction, Solar spectrum, Atmospheric models, Scattering, Brightness, Measurement, Reflection, Energy, Meteorological phenomena, Photomultipliers.

Theoretical and experimental studies on the brightness and polarization of the daylight sky and the reflectivity of the atmosphere and the ground are briefly reviewed. The salient features of a new photoelectric skylight polarimeter to be used in the near ultraviolet and visible parts of the electromagnetic spectrum employing a rotating retardation plate as polarization modulator with constant angular and linear apertures are described in detail. The proposed measurements with this instrument are briefly indicated. (Author)

AD-413 341 Div. 2
(TISTP/AMS) OTS price $4.60

Navy Mine Defense Lab., Panama City, Fla.
SURFACE CURRENTS IN THE NORTHEASTERN GULF OF MEXICO.
by G. G. Salsman and W. H. Tolbert. Aug 63, 43p.
Proj. SR011 01 01, Task 0401
NMDL Rept. no. 209 Unclassified report

Descriptors: (*Ocean currents, Oceanographic data), (*Oceanographic data, Ocean currents), Gulf stream, Oceanology, Surfaces, Test methods, Experimental results.

During the 28-month interval from September 1960 through December 1962, drift bottles were released periodically from a stationary platform located 11 nautical miles offshore from Panama City, Florida. Of the 951 bottles released, 276, or 29% were recovered. Approximately 67% of the returns have been found along a 200-mile section of coastline extending from Cape St. George west to the Florida-Alabama line; 20% of the returns were from the Florida east coast and Keys; and 12% of the returns were found along the coasts of Alabama, Mississippi, Louisiana, and Texas. Comparison of the drift bottle data with local wind information indicates that the primary mechanism of surface water transport in the vicinity of the release point is wind-induced currents, which either transport the bottles to local beaches or to regions where permanent or semi-permanent currents can displace them to western or southern shores. The results of this study are also compared with other drift bottle studies conducted in the Gulf of Mexico. (Author)

AD-413 344 Div. 2
(TISTP/MFA) OTS price $7.70

Maryland U., College Park.
DISTRIBUTION OF ESTUARINE MEANDERS.
Final rept.,
by Frank Ahnert. 1963, 70p.
Grant Nonr G00048 62, Proj. NR388 069
Unclassified report

Descriptors: (*Estuaries, Distribution), (*Rivers, Geography), Delta, Analysis, Maps.

A world-wide map survey of the occurrence and distribution of estuarine meanders forms the basis for this investigation. This distribution is related to environmental conditions in order to arrive at conclusions about the factors entering into the development of estuarine meanders, and to ascertain whether estuarine meanders constitute characteristic landform elements of certain types of coasts. It was found that there is no significant dependence of estuarine meander development upon tidal range, except that on tideless coasts and on coasts with a very small tidal range estuarine meanders are absent for lack of alternating tidal currents of sufficient strength. Eighty-seven percent of all observed estuarine meander sites occur on mangrove coasts, lagoon-barrier coasts, deltaic coasts, and embayed plateau or coastal plain coasts - a concentration which indicates that these coastal types provide especially favorable conditions, namely, locations sheltered from wave attack, and the availability of fine material for deposition in the form of tidal flats. Additional requirements are the presence of alternating tidal currents flowing with comparable maximum strength at about the same water level, and relative stability of sea level since the last major glacio-eustatic adjustments took place. (Author)

AD-413 345 Div. 2
(TISTP/FEM) OTS price $3.60

Travelers Research Center, Inc., Hartford, Conn.
OBJECTIVE ANALYSIS OF PRECIPITATION OCCURRENCE AND TYPE,
by Frederick P. Ostby, Jr. Aug 62, 26p. Rept. no. 7044 29; Technical publication no. 16
Contract FAA BRD363
Unclassified report

Descriptors: (*Atmospheric precipitation, Statistical distributions), (*Weather stations, Meteorological parameters), Analysis, Rainfall, Snow, Probability, Statistical analysis, Weather forecasting, Density, Liquids, Computers, Tables.

An objective technique was developed to analyze precipitation occurrence and type. A weighted-averaging method was used, in which the contribution of a station observation to the analysis is a function of its distance from the gridpoint. A square area centered on a gridpoint was searched to locate stations to be used in the analysis. Developmental testing on 49 hr of data from January 1961 and 72 hr from September 1960 over the eastern half of the United States showed that the method correctly specified whether precipitation was occurring for more than 90% of the analysis area. (Author)

AD-413 384 Div. 2
(TISTP/AMS) OTS price $3.60

Travelers Research Center, Inc., Hartford, Conn.
SCORING SYSTEM FOR CATEGORICAL FORECASTS OF CEILING AND VISIBILITY,
by Joseph G. Bryan. Mar 63, 31p. Technical pub. no. 26
Contract FAA BRD 363, Proj. 204 1
Unclassified report

Descriptors: (*Weather forecasting, Reliability), (*Ceiling, Weather forecasting), (*Visibility, Weather forecasting), Mathematical analysis, Statistical analysis, Simultaneous equations, Taylor's series, Probability.

A system of merits and demerits is derived for the verification of categorical forecasts of either ceiling or visibility, each being divided into five operationally significant classes. A general asymmetrical pattern of progressive penalties is investigated and found, under stated assumptions, to reduce to symmetry. By optimizing a criterion of statistical sensitivity in comparing two forecasting methods, it is shown that in the typical distribution of class frequencies, with class 5 more probable than the other four combined, demerits should be zero except when the error concerns class 5. Scoring tables are given for ceiling and visibility at seven air terminals. (Author)

AD-413 386 Div. 2
(TISTP/AMS) OTS price $3.60

Travelers Research Center, Inc., Hartford, Conn.
OBJECTIVE ANALYSIS OF SURFACE VISIBILITY,
by Earl L. Davis. Aug 62, 33p. Technical Pub. no. 15
Contract FAA BRD 363
Unclassified report

Descriptors: (*Visibility, Meteorology), (*Meteorology, Visibility), Weather forecasting, Meteorological parameters, Analysis, Mathematical analysis, Equations, Meteorological charts.

Three methods of computing a weighted average of surface visibility at gridpoints were developed and tested. These methods employ (a) a simple weighted average, (b) a weighted average using a transformation of the observed visibility to emphasize low values, and (c) a transformed variable that considers the area represented by a reporting station. Various options, such as grid spacing, size of the search area, weighting functions, and solution for indeterminate points,

were tested with a total of 152 hr or airways data. Results indicate that the method used and selection of options are best defined by the user's requirements. (Author)

AD-413 387 Div. 2
(TISTP/AMS) OTS price $8.60

Travelers Research Center, Inc., Hartford, Conn.
OBJECTIVE ANALYSIS OF SEA-LEVEL PRESSURE AND SURFACE TEMPERATURE, DEW POINT, AND WIND,
by Albert Thomasell, Jr. and James G. Welsh.
Nov 62, 87p. Technical pub. no. 19
Contract FAA BRD363, Proj. 204 2
Unclassified report

Descriptors: (*Meteorological parameters, Test methods), Meteorological charts, Sea breeze, Dew point, Weather forecasting, Wind, Pressure, Temperature, Meteorology, Climatology, Programming (Computers), Analysis, Data, Mathematical analysis.

The successive-approximation technique (SAT) was developed for the objective analysis of sea-level pressure and surface temperature, dew point, and wind over the eastern United States. SAT analyses are demonstrated to be at least comparable to subjective analyses. Continuity within a series of objective analyses is good, and the agreement among the independently analyzed fields of pressure, temperature, and wind is excellent. Developmental tests using the airways observation network showed that the best analysis is produced by using large influence radii, a smoothing operator, and a grid mesh of approximately 50 mi. The effect of using large influence radii and smoothing in SAT is to approximate curvilinear interpolation between observations. We interpret this to mean that such curvilinear interpolation is the best method of specifying the analysis field between data points. A typical analysis for the eastern U.S. requires 2 or 3 min on an IBM 7090 electronic computer. An alternative analysis procedure, which performs curvilinear interpolation directly, is suggested as a possible method for reducing the machine time required for an analysis. (Author)

AD-413 404 Div. 2
(TISTP/FEM) OTS price $9.10

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Summary rept.
Nov 62, 94p. Technical pub. no. 27
Contract FAA BRD363
Unclassified report

Descriptors: (*Meteorological parameters, Mathematical prediction), (*Data processing systems, Meteorological radar), (*Weather forecasting, Probability), Statistical processes, Flight control systems, Weather stations, Weather communications, Visibility, Wind, Clouds, Cloud cover, Atmospheric precipitation, Ceiling, Climatology, Meteorological phenomena.

Second in a series of reports on the development of a meteorological data processing subsystem in support of the Common Aviation Weather System is presented. The status of work on automated techniques for producing short range terminal forecasts (0-2 hrs), medium range terminal forecasts (2-24 hrs), flight weather analysis and predictions, radar data utilization, data control and handling, and tests of the processing design is discussed. A description and status of computer programs under development as well as a list of published technical reports and memoranda are included. (Author)

AD-413 408 Div. 2
(TISTP/MFA) OTS price $3.60

Naval Postgraduate School, Monterey, Calif.
A FIVE-LEVEL BAROCLINIC PREDICTION MODEL,
by Celia L. Barteau and William D. Groscup.
1963, 41p.
Unclassified report

Master's thesis.

Descriptors: (*Meteorology, Analysis), (*Weather forecasting, Meteorological parameters), Barometric pressure, Vortices, Meteorological charts, Mathematical models, Mathematical prediction, Height finding, Tests, Equations, Programming (Computers).

A five-level baroclinic model for numerical prediction of height fields at 1000, 850, 700, 500, and 300 mb is developed and programmed. Several forms of the model are tested to determine the contribution of the various terms of the vorticity equation. Forecasts from three different methods are compared. The model shows utility in prognosis. Although there are individual differences among the methods, no one of the three is significantly better over the entire hemisphere on the data tested. (Author)

AD-413 415 Div. 2
(TISTP/FEM) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
STATISTICS OF CUMULIFORM CLOUDS FROM U-2 PHOTOGRAPHS.
Final rept.,
by R. H. Blackmer, Jr. and J. E. Alder. May 63, 52p.
Contract AF33 653 3892, SRI Proj. 3892
Unclassified report

Descriptors: (*Cumulus clouds, Aerial photographs), (*Cloud cover, Statistical analysis), (*Cumulonimbus clouds, Periodic variations), Diurnal variations, Statistical distributions, Atmospheric motion, Meteorological radar, Photographic analysis, Thunderstorms, Satellites (Artificial), Maps, Air mass analysis, Meteorological parameters, Wind, Temperature, Aerial cameras, Photogrammetry, Cyclones, Infrared detectors.

Cumuliform cloud cover was analyzed with a view to determining the probable appearance of this type of cloud cover from satellite altitudes. Several types of data were utilized in these analyses. The distribution of cumuliform clouds over the northern hemisphere was determined from climatological charts. The diurnal variation of the clouds was investigated from a series of hourly weather observations. The appearance of the cloud cover at various angles of view was determined from U-2 photographs of the cloud cover. U-2 photographs and summaries of radar data were analyzed to determine the extent and altitudes of thunderstorms in a squall line. An example of the radiation pattern of cloud cover as shown by TIROS II infrared sensors is also included. (Author)

AD-413 447 Div. 2
(TISTM/AMS) OTS price $3.60

Travelers Research Center, Inc., Hartford, Conn.
STATISTICAL FORECASTING UNDER OPERATIONAL CONDITIONS,
by Isadore Enger. June 62, 29p. Rept. no. 7083 22; Technical publication no. 12
Contract FAA BRD363
Unclassified report

Descriptors: (*Weather forecasting, Statistical analysis), (*Statistical analysis, Weather forecasting), Climatology, Meteorology, Ceiling, Dew point, Wind, Tables, Data, Operation, Equations.

This paper describes seven statistical forecast techniques and their quick, easy use in preparing a weather forecast under operational conditions. Each technique provides a set of tables and equations and requires no more than present observations and a desk calculator. Examples are given, and the difficulty of producing a forecast is estimated for each technique. (Author)

AD-413 448 Div. 2, 1
(TISTP/FEM) OTS price $2.60

Travelers Research Center Inc., Hartford, Conn.
A MULTIPLE-DISCRIMINANT ANALYSIS OF CLEAR-AIR TURBULENCE,
by John T. Ball. Oct 62, 25p. Rept. no. 7044 42; Technical publication no. 22
Contract FAA BRD363
Unclassified report

Descriptors: (*Turbulence, Analysis), (*Meteorological phenomena, Atmosphere motion), Radiosondes, Fluid flow, Wind, Stability, Atmospheric temperature, Shear stresses, Weather forecasting, Statistical analysis, Data processing systems, Meteorological parameters, Clouds, Cirrus clouds.

Screening multiple-discriminate analysis (MDA) is used to select specifiers for objectively analyzng clear-air turbulence (CAT) with the aid of an electronic computer. The data consist of a special 5-day collection of commercial and military aircraft reports of intensities of CAT and no CAT made by the Weather Bureau. In the analysis, volumes of space are classified with regard to CAT intensity for 6-hr intervals. The variables used to specify these classifications are obtained from 6- and 12-hourly radiosonde observations and upper-level charts. These include standard flow, shear, and stability parameters, both at the time of occurrence and for 6 hr prior to the occurrence. The MDA program selected the height of the maximum wind level and the horizontal temperature gradient as the two specifiers best able to discriminate between categories of CAT. The significance of the selection of these specifiers in the light of the data sample used is discussed, and recommendations are made for further work in turbulence, both in research and engineering areas. (Author)

AD-413 487 Div. 2
(TISTP/FEM) OTS price $1.60

Florida State U., Tallahassee.
FREEZING WEATHER IN PENINSULAR FLORIDA,
by H. Landers. 1 May 63, 16p.
Contract Cwb53 245
Unclassified report

Descriptors: (*Air mass analysis, Meteorological charts), (*Atmosphere motion, Cyclones), (*Meteorological phenomena, Freezing), (*Freezing, Economics), Costs, Temperature control, Surface temperature, Atmosphere temperature, Models (Simulations), Hygrometers, Thermometers, Weather stations, Weather forecasting, Temperature, Barometric pressure.

The synoptic situations which bring serious freezing weather to the Florida Peninsula are discussed generally by presenting various weather charts for an average of 41 freezing days which occurred during four winters. More specifically and individual freezing situation is compared with the four-year average and the three-dimensional motion, temperature distribution and time changes of temperature are dealt with in some detail. A speculative scheme is presented which might permenently eliminate serious freezing in the Florida Peninsula. Before any solution can be reached, it is necessary to be able to define the problem with more accuracy. An observationa program is proposed as a first step in this direction. (Author)

AD-413 488 Div. 2
(TISTP/AMS) OTS price $2.60

Air Weather Service, Scott Air Force Base, Ill.
A STUDY ON FORECASTING STRONG OR GUSTY SURFACE WINDS AT FORT SILL, OKLA.
15 July 63, 31p.
Unclassified report

Descriptors: (*Weather forecasting, Wind), Gusts, Data, Statistical analysis, Statistical data, Temperature.

Forecasting the occurrence of operationally critical strong or gusty surface winds represents a major forecast problem at Fort Sill, Oklahoma. This study was conducted to develop an objective technique for forecasting these surface winds or gusts. (Author)

AD-413 490 Div. 2, 25
(TISTP/JP) OTS price $4.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
LIBRATION POINT STUDIES. AN ANALYTICAL APPROACH.
by Paul Michael Ulshafer. June 63, 41p.
AFIT GGC 63 Unclassified report

Master's thesis.

Descriptors: (*N-body problem, Satellites (Artificial)), (*Celestial mechanics, Satellites (Artificial)), (*Satellites (Artificial), Oscillation), Earth, Moon, Orbital trajectories, Perturbation theory.

Significant reductions in the amplitude of oscillations of a small body about the Restricted Three-Body libration points can be attained through proper selection of initial conditions and the Sun's position at the time of satellite insertion. These conditions can be closely approximated by minimizing the 'first order' solution of the restricted four-body equations of motion. The procedure used in this report succeeded in reducing peak amplitudes for stable motion and divergence rates for unstable motion by approximately 70 and 75 percent, respectively. (Author)

AD-413 493 Div. 2
(TISTP/FR) OTS price $5.60

Eastern Air Lines, Inc., Miami, Fla.
AN IN-FLIGHT STUDY OF THE RELATION BETWEEN JET STREAMS, CIRRUS, AND WIND SHEAR TURBULENCE.
Final rept.,
by Paul W. Kadlec. June 63, 48p.
Contract Cwb 10356
Unclassified report

Descriptors: (*Wind, High altitude), Cirrus clouds, Jet streams (Meteorology), Turbulence, Temperature.

An analysis of data from 414 weather research flights indicates a relationship between cirrus clouds associated with jet streams and the occurrence of wind shear turbulence. These data were obtained while flying as a crew member on Eastern Air Lines jet aircraft from December 1960 to May 1963. Detailed horizontal and vertical cross-sections for each flight and colored slides of cirrus cloud formations together with the corresponding surface and upper air data were analyzed. Four cloud pattern models have been developed to describe the areas of occurrence, thickness and horizontal extent of cirrus that have been found to produce significant turbulence. The polar and subtropical jet streams have been classified by type and configuration to aid in determining the areas and intensity of turbulence in the cirrus. A fifth jet stream model indicates those situations in which cirrus does not form. (Author)

AD-413 541 Div. 2
(TISTP/JP) OTS price $6.60

Geophysical Inst., U. of Alaska, College.
ELECTRON CONTENT VARIATIONS IN THE AURORAL IONOSPHERE DETERMINED FROM SATELLITE RADIO OBSERVATIONS,
by Jerry L. Hook. May 63, 62p. SR2;UAG R136
Contract Nonr3010 04
Unclassified report

Descriptors: (*Electron density, Measurement), (*Radio waves, Diffraction), (*Aurorae, Luminescence), (*Ionosphere, Electron density), Satellites (Artificial), Terrestrical magnetism.

The relationship between (1) spatial distribution of ionization using 20 and 40 mc/s transmissions from a satellite, (2) the location and luminosity profiles of auroras as measured from ground stations in Alaska, and (3) the flux and energy spectrum of particles penetrating to auroral height as measured by satellite instruments is reported. The experiment was carried out in March, 1962 using a polar orbiting satellite which made twelve passes over Alaska during its operational lifetime. The emphasis of this work is on the determination by radio techniques of the variation of electron content in the ionosphere connected with incident particle fluxes. Methods of determining the electron content from differential Doppler measurements are discussed in detail. The experimental results show that increases in electron content are morphologically correlated with regions of auroral luminosity and incident particle fluxes. The results of the experiments also point out the value of conducting coordinated experiments in the study of auroral phenomena. (Author)

AD-413 588 Div. 2
(TISTP/FEM) OTS price $9.10

Naval Postgraduate School, Monterey, Calif.
A STATISTICAL INVESTIGATION OF THE DIURNAL TEMPERATURE VARIATION DURING THE POLAR NIGHT AT McMURDO SOUND, ANTARCTICA,
by Donald B. Barrigar. 1963, 94p.
Unclassified report

Master's thesis.

Descriptors: (*Atmosphere temperature, Polar regions), (*Polar regions, Atmospheric temperature), (*Diurnal variations, Statistical analysis), Climatology, Meteorological phenomena, Periodic variations, Meteorological parameters, Models (Simulations), Air, Temperature, Wind, Velocity, Cloud cover, Atmospheric motion, Experimental data, Punched cards, Magnetic tape, Digital computers.

During the polar night, 24-hour periods with a clear sky and light to moderate winds have their lowest temperatures in the middle of the period, and the highest temperatures occur at the beginning and end. For cloudy and windy periods, the shape of the temperature curve is reversed, with the maximum temperature occurring near the middle of the period. Using six years of surface data, the diurnal temperature variation for various special types of days is divided into two parts, the meteorological or diurnal variation and the superimposed statistical bias. Finally, the meteorological diurnal temperature variation, based upon all observations during the six year period, is determined. (Author)

AD-413 601 Div. 2
(TISTP/FEM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MICROBAROGRAPH FOR THE REGISTRATION OF VERY SMALL FLUCTUATIONS OF ATMOSPHERIC PRESSURE CAUSED BY THE PASSAGE OF INTERNAL WAVES,
by A. A. Gus'kov. 17 June 63, 5p.
FTD TT63 541 Unclassified report

Trans. from Trudy Morskogo Gidrofizicheskogo Instituta, Izdatel'stvo Akademii Nauk SSSR, Moscow, Vol. 23, pp. 148-150, 1961.

Descriptors: (*Microbarometric waves, Detection), (*Barometers, Micrometeorology), (*Barometric pressure, Measurement), Sensitivity, Amplifiers, Thermistors, Calibration, Temperature control, Radiosondes, Atmospheric tides, Atmospheric motion.

AD-413 696 Div. 2, 32
(TISTP/FR) OTS price $8.60

Marine Lab., U. of Miami, Coral Gables, Fla.
THE HURRICANES OF THE CARIBBEAN SEA AND ADJACENT REGIONS DURING THE SIXTEENTH CENTURY.
Preliminary rept. 1 July 62-30 June 63,
by Jose Carlos Millas. June 63, 89p. Rept. nos. 8242 1; ML 63377
Contract Cwb 10467
Unclassified report

Descriptors: (*Tropical cyclones, History).

AD-413 804 Div. 2
(TISTP/FR) OTS price $1.10

American Meteorological Society, Boston, Mass.
POLARIZATION OF THE CYGNUS A RADIOGALAXY (Poliarizatsiia radiogalaktiki Lebed' A),
by V. I. Slysh. 1962, 3p.
Contract AF19 604 6113
Unclassified report

Trans. from Priroda, 1962.

Descriptors: (*Extraterrestrial radio waves, Polarization), Galaxies, Polarization, Electrons, Magnetic fields.

AD-413 840 Div. 2, 25, 6
(TISTP/MFA) OTS price $3.60

Cornell U., Ithaca, N. Y.
THE INTERSTELLAR ABUNDANCE OF THE HYDROGEN MOLECULE: I. BASIC PROCESSES,
by Robert J. Gould and Edwin E. Salpeter.
Jan 63, 33p. CRSR135
Grant AF AFOSR62 191
AFOSR 4959 Unclassified report

Descriptors: (*Interstellar matter, Analysis), (*Hydrogen, Molecules), Stars, Cooling, Dissociation, Radio astronomy, Detection, Galaxies, Photons, Cosmic rays, Protons, Ionization, Clouds, Ultraviolet radiation, Thermal radiation, Particles.

An analysis is given of the various processes which determine the molecular concentration in H I clouds. The most important mechanism for forming molecular hydrogen is association on the surface of the interstellar grains, the characteristic time for conversion to molecular form being about 100 million years. It is shown that the range of grain temperatures where this recombination reaction is efficient is coincident with the range 5-20 K which is expected to result from the interaction with the interstellar radiation field. It is estimated that the efficiency (recombination coefficient) of the process is between 0.1 and 1. Regarding dissociative processes, photodissociation through the forbidden transition between the two Heitler-London states of the molecule, previously thought to be most important, is shown to be negligible. Ionization and dissociation of a cloud by random encounters with O and B stars occurs about once every 100 million years, so that if the grain recombination process is operative a balance results in which the molecular abundance is roughly comparable to the observed atomic concentration. The cooling properties of molecular hydrogen are discussed. (Author)

AD-413 850 Div. 2, 25, 32
(TISTM/TCG) OTS price $2.60

Hughes Tool Co., Culver City, Calif.
CORDIERITE DATA SHEETS,
by John T. Milek. June 63, 25p. Rept. no. DS128
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Minerals, Electrical properties), (*Data, Electrical properties), (*Bibliographies, Minerals), Dielectric properties, Resistance (Electrical), Electric insulation.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Cordierite. (Author)

AD-413 857 Div. 2
(TISTE/CAM) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MEASUREMENT OF VERTICAL DISTRIBUTION OF OZONE FROM A POLAR ORBITING SATELLITE,
by R. D. Rawcliffe, G. E.Meloy, R. M. Friedman, and E. H. Meloy. 26 July 63, 12p. Rept. no. TDR169 3260 50 TN-3
Contract AF04 695 169
SSD TDR63 161
Unclassified report

Descriptors: (*Radiometer, Ozone), (*Ozone, Measurement), Satellites (Artificial), Polar orbit trajectories, High altitude, Ultraviolet radiation, Photomultiplier, Programming (Computers), Analysis, Optical filters.

A satellite-borne radiometer has been used to determine the vertical distribution of ozone at high altitudes. The attenuation, due to the ozone, of solar ultraviolet radiation passing obliquely through the atmosphere was measured at times of sunrise and sunset(as seen by the orbiting vehicle). The sensor employed a photomultiplier tube and filter combination plus a quartz light pipe that allowed a uniformly sensitive field of view of ±10 deg in elevation and 350 deg in azimuth. A transition from full sunlight to signal extinction, or vice versa, occurred in a period of about 20 seconds, twice per orbit. The shape of this step has been analyzed with a 7090 computer program to deduce the vertical ozone distribution at altitudes above the maximum. The orbital parameters were such that sunset and sunrise occurred when the vehicle was near 33 degrees S and 13 degrees S latitudes, respectively. (Author)

AD-413 917 Div. 2
(TISTP/FEM) OTS price $2.60

Sacramento Peak Observatory, Sunspot, N. Mex.
HE I EXCITATION IN CHROMOSPHERIC FLARES,
by N. V. Steshenko and V. L. Khokhlova, tr. by Alice B. Dunn. 1963, 19p. Solar research note no. 35
AFCRL Rept. no. 63 277 Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. 27, pp. 120-139, 1962.

Descriptors: (*Solar flares, Absorption spectrum), (*Solar spectrum, Excitation), (*Line spectrum, Helium), Electron density, Telescopes, Optical phenomena, Images, Scattering, Temperature, Solar atmosphere, Recombination reactions, Emissivity, Tables, Heating, Energy, Plasma medium, X-ray spectrum.

The study of 11 emission lines of parahelium and orthohelium in the flare of August 30, 1959 and also several lines in other flares, shows that the optical depth of the helium lines (with the exception of gamma gamma 5876 and 4471) is small in the region gamma gamma 3700-6700 Angstrom of flares observed on the solar disk and at the limb. The population of excited He I levels is derived from the energy of the lines, taking into account the optical depth of non-transparent lines. The line-widths are used for obtaining the upper limit of kinetic temperature in the He I emission region assuming that line broadening is due only to the thermal velocities of the atoms. (Author)

AD-413 919 Div. 2
(TISTP/FEM) OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
RESULTS OF OBSERVATIONS OF THE CORONAL SPECTRUM OF 19 JUNE 1936,
by G. A. Shain, tr. by Alice B. Dunn. 1963, 11p. Solar research note no. 32
AFCRL Rept. no. 63 274 Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. 1, Pt. 1, pp. 102-115, 1947.

Descriptors: (*Solar eclipses, Line spectrum), (*Solar spectrum, Emissivity), (*Spectrophotometers, Solar corona), Scattering, Photographic analysis, Spectrographic cameras, Brightness, Solar radiation, Ultraviolet radiation, Intensity, Frequency, Electron density, Motion, Doppler effect, Atmospheric refraction, Absorption spectrum.

Results of spectrophotometric study of emission

lines in the spectrum of the inner corona are cited; (1) The total intensity of emission lines changes from one coronal region to another and from eclipse to eclipse. (2) A comparison of spectrophotometric measurements of spectra for 1929 and 1936 reveals considerable difference with respect to intensity of emission lines. (3) The decrease in intensity of emission lines with distance from the edge of the disk is not proportional to the corresponding decrease of intensity of the continuous spectrum; gradients are considerably higher for lines, with the exception, probably, of 4231. (4) The observed deviation in curves of intensity changes in lines and in the continuous spectrum with distance from the edge of the disk must be attributed, first of all, to local effects. (5) The validity of the observed retardation in the growth of intensity of emission lines, or even the decrease of intensity within limits 0-1', is doubtful. One can suspect the presence of a decrease in intensity for distances less than 0'.5 only on the basis of indirect reasoning, and others. (Author)

AD-413 920 Div. 2
(TISTP/FEM) OTS price $1.60

Sacramento Peak Observatory, Sunspot, N. Mex.
THE BEHAVIOR OF SOME LINES OF RARE-EARTH ELEMENTS ON THE SOLAR DISK,
by N. N. Stefanovich, tr. by Alice B. Dunn. 1963, 9p. Solar research note no. 33
AFCRL Rept. no. 63-275 Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. 17, pp. 191-198, 1957.

Descriptors: (*Solar spectrum, Rare earths), (*Solar radiation, Emissivity), (*Solar atmosphere, Brightness), Absorption, Solar flares, Identification, Measurement, Ionization, Cerium, Praseodymium, Neodymium, Samarium, Gadolinium, Terbium, Dysprosium, Holmium, Promethium, Erbium, Line spectrum, Europium, Solar eclipses, Potassium, Hydrogen, Doppler effect, Absorption spectrum, Band spectrum.

AD-413 921 Div. 2
(TISTP/FEM) OTS price $1.10

Sacramento Peak Observatory, Sunspot, N. Mex.
THE SEQUENCE OF APPEARANCE OF LINES OF DIFFERENT ELEMENTS IN FLARES,
by N. N. Stepanyan, tr. by Alice B. Dunn. 1963, 3p. Solar research note no. 36
AFCRL Rept. no. 63 278 Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs. 26, pp. 41-44, 1961.

Descriptors: (*Solar flares, Line spectrum), (*Solar spectrum, Brightness), Photographic analysis, Rare earths, Metals, Magnesium, Aluminum, Iron.

AD-413 941 Div. 2
(TISTP/FEM) OTS price $1.10

Sacramento Peak Observatory, Sunspot, N. Mex.
HELIUM EMISSION OF THE CHROMOSPHERIC FLARE OF SEPTEMBER 14, 1958,
by N. V. Steshenko and V. I. Khokhlova, tr. by Alice B. Dunn. 1962, 8p.
SPO SRN34; AFCRL 63 276 Unclassified report

Trans. from Izvestiya Krimskoi Ast. Obs., Vol. 23, pp. 322-220, 1960.

Descriptors: (*Solar flares, Emissivity), (*Helium, Line spectrum), Solar atmosphere, Absorption, Excitation, Solar spectrum, Spectrophotometers, Attenuation, Solar radiation, Brightness, Radiofrequency, Noise, Doppler effect.

The emission lines lambda 3965, 5016, 6678, 5876 and 4713 were studied in a flare on the disk. With the exception of lambda 5876, the above HeI lines have no self-absorption. The intensities of optically thin lines were used for the determination of the population of the upper levels of the corresponding transitions and the estimation of the upper limit of population of the lower levels of these transitions. The outer absorbing layer projected on the flare and the self-absorption in the flare were taken into account when interpreting the profile of the D(3) line and calculating the population of the 2(3)P and 3(3)D levels. It is noted that the scattering of solar radiation cannot play a decisive role in the excitation of the higher levels of HeI in the investigated flare. (Author)

AD-413 986 Div. 2
(TISTP/FEM) OTS price $4.60

Sacramento Peak Observatory, Sunspot, N. Mex.
NONSTATIONARY PROCESSES IN SOLAR MAGNETIC FIELDS. THE GENERATION OF FLARES AND HEATING OF FACULAE,
by A. B. Severny, tr. by Alice B. Dunn. 1963, 45p.
SPO Solar research note no. 38
Unclassified report

Descriptors: (*Solar flares, Magnetic fields). (*Solar spectrum, hydrogen). (*Solar atmosphere, Heating). Sunspots, Polarization, Emissivity, Solar radiation, Line spectrum, Plasma medium, Gases, Magnetohydrodynamics, Velocity, Density, Pressure, Temperature, Electron density, Doppler effect.

The considerations of non-stationary processes originating in the sun's magnetic fields (flares, faculae) are considered in detail. This work is a continuation of the investigation of magnetic fields connected with flares carried out in 1958 which led to the representation of solar flares as a sort of pinch-effect originating in the neutral points of the crossed magnetic fields when the field gradient is increasing. Since that time however a considerable amount of new experimental data appeared which, on one hand, confirmed the improtant role of the changes in magnetic fields for the generation of flares but on the other, however, demanded a more precise picture of the process and the introduction of substantial corrections. The present work is dedicated to this precision and alteration of the primary picture of the sun's flare generation. In addition, the slow processes of heating and compression of solar plasma are considered, for apparently they are significant for explanation of the solar faculae. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-412 505 Div. 3
(TISTB/AAR) OTS price $10.10

Science Communication, Inc., Washington, D. C.
RECOVERY AND DECONTAMINATION MEASURES AFTER BIOLOGICAL AND CHEMICAL ATTACK.

Final rept.
11 Mar 63, 115p.
Contract OCD OS 62 183
Unclassified report

Descriptors: (*Biological warfare, Decontamination), (*Chemical warfare, Decontamination), Water, Detection, Respiration, Protective clothing, Soaps, Food, Materials, Terrain, Vapors, Gases, Protective masks.

AD-412 715 Div. 3, 6, 13
(TISTP/AW) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
COLLECTIVE PROTECTION EQUIPMENT FOR THE AN/MSG-4 SYSTEM. PHASE II AND III. DEVELOPMENT, FABRICATION AND TEST.
Bi-monthly progress rept. no. 8, 1 May-30 June 63, by L. W. Maples. 30 July 63, 9p.
Contract DA18 108CML6618
Unclassified report

Descriptors: (*Trailers, Chemical warfare agents), (*Cooling and ventilating equipment, Shelters), Radar equipment, Biological warfare agents, Bacterial aerosols, Countermeasures, Air-intake filters, Antiaircraft defense systems, Combat information centers.

Effort was devoted primarily to the following items: (1) Fabrication of protective entrances for AN/MSQ-18 OC/CDG vehicles, AN/MPS-23 RET, AN/MSM-34, and AN/MSM-55 vehicles, AN/GSS-1D shelter, AN/TSQ-38 OC/CDG shelters, and AN/MSQ-28 WMC/RDPC vehicles; (2) Fabrication of four additional skid bases and storage boxes; (3) Fabrication and simulated installation of vehicle modification kits and CPE system installation kits; (4) Resolution of protective entrance door design problem; (5) Resolution of motor overload protection problem; (6) 400 CFM filter unit additional high and low temperature testing; (7) 400 CFM filter units and control panels acceptance testing; (8) AN/MSQ-18 vehicle and AN/GSS-1D shelter air leakage testing completion; and (9) Preparation of 400 CFM filter unit purchase description. (Author)

AD-412 940 Div. 3, 1
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A PYRO-MECHANISM,
by G. A. Rokhlin and V. M. Zas'ko. 26 July 63, 8p.
FTD TT61 366 Unclassified report

Trans. from Russian Patent No. 129950 (Appl. No. 639728). pp. 1-2, 26 Sep 59.

Descriptors: (*Ejection seats, Actuators), (*Actuators, Pyrotechnics), Safety devices, Spin recovery parachutes, Patents, Stabilization.

This invention is a pyro-mechanism which has two pyro-heads. The upper head, connected to a rod by means of a ball lock and an extension strand, contains a small stabilizing parachute; the lower pyro-head has a bolt which locks the pyro-mechanism to the seat, firing it from the seat and activating the second stabilizing chute. (Author)

AD-413 899 Div. 3, 30
(TISTP/WH) OTS price $1.10

ITT Federal Labs., Nutley, N. J.
STUDIES OF THE OUTSTANDING DEFICIENCIES OF THE E41 ALARM.
Bimonthly rept. no. 1.
July 63, 9p.
Contract DA18 108AMC136A
Unclassified report

Descriptors: (*Toxic agent alarms, Automatic), Chemical warfare agents, Agents, Electric motors, Heating, Gas flow, Electric currents, Control systems.

4. CHEMISTRY

AD-412 343 Div. 4
(TISTM/TCG) OTS price $1.10

Wisconsin U., Madison.
STUDY OF REACTIONS BETWEEN TERTIARY AMINES AND ORGANOHALOGENATING AGENTS.
Final rept., 1 July 61-7 May 62,
by T. Higuchi. 1 July 62, 7p.
Grant DA CML18 108 61 G22
Unclassified report

Descriptors: (*Organic compounds, Amines), (*Hypochlorites, Reaction kinetics), (*Reaction kinetics, Halogenated hydrocarbon), Halogenation, Theory, Chemical reactions, Alkanes, Electrometers, Electric potential.

The kinetics of the reactions of hypochlorous acid with trialkylamines were studied. These reactions were investigated as it was thought that the organo-halogenating agents acted by liberation of HOCl which then reacted with the tertiary amines. The present contribution is concerned with the confirmation of the mechanism of this complex reaction and evaluation of the several rate constants involved. Experimental results indicated the over-all mechanism of the reaction of hypochlorous acid with the trialkylamines. The existence of an intermediate such as the trialkylchlorammonium ion or its equivalent, has been clearly demonstrated by the observance of lag times in the production of dialkylchloramine, the presumed end product. (Author)

AD-412 357 Div. 4, 14
(TISTM/TCG) OTS price $9.60

Instituto de Quimica Fisica (Spain).
SURFACE REACTION OF IRON WITH THIO- AND PHOSPHORUS- ORGANIC COMPOUNDS DISSOLVED IN HYDROCARBONS,
by J. Llopis, J. M. Gamboa, L. Arizmendi and J. A. Gomez Minana. 30 Apr 63, 105p.
Contract AF61 052 523
Unclassified report

Descriptors: (*Lubricant additives, Surface properties), (*Iron, Chemical reaction), (*Organic compounds, Lubricant additives), Metalorganic compounds, Organic phosphorus compounds, Labeled substances, Organic solvents, Hydrocarbons, Oxygen, Reaction kinetics, Air, Radioactivation analysis, Radioactive isotopes, Distillation, Purification, Synthesis (Chemistry), Organic sulfur compounds.

The use of compounds labelled with S-35 or P-32

permits the study of the surface interaction of extreme pressure lubrication additives with Fe. Hexadecane has been used as solvent. The efficiency of the radiochemical method has been emphasized. In the work here described, the behaviour of a series of butyl sulphides and polysulphides up to the tetrasulphide has been studied. A mechanism to explain the surface reaction has been postulated, taking into account the lability of the S atoms in the molecules. The presence of oxygen increases the reactivity of mono- and disulphides, but decreases that of the mercaptans, this diminution being more important in the case of tri- and tetrasulphides. A mechanism to explain the action of oxygen in this sulphuration reaction has been proposed. The behaviour with Fe of tricresyl phosphate and tributyl phosphite has been studied. In both cases a decisive influence of oxygen in the kinetics of the surface reaction has been observed. (Author)

AD-412 485 Div. 4
(TISTM/AMS) OTS price $1.10

Kings Coll., U. of London (Gt. Brit).
COORDINATION CHEMISTRY OF GROUP III.
Annual summary rept.,
by N. N. Greenwood. Mar 63, 4p.
Grant AF EOAR62 27
AFOSR 4802 Unclassified report

Descriptors: (*Chemical compounds, Scientific research), Aluminum compounds, Gallium compounds, Halides, Hydrides, Complex compounds, Thermochemistry, Stereochemistry, Amines, Chemical properties, Physical properties, Reports.

AD-412 764 Div. 4
(TISTB/AAR) OTS price $1.10

Isomet Corp., Palisades Park, N. J.
STUDY AND DESIGN OF A SOLID ELECTROLYTE CARBON DIOXIDE REDUCTION SYSTEM,
by Horace W. Chandler and William Oser. July 63, 7p.
Contract AF33 657 8066
AMRL M48 Unclassified report

Descriptors: (*Carbon dioxide, Reduction), Design, Electrolytes, Solids, Life expectancy, Platinum, Wire, Catalysts, Pumps, Weight, Volume, Power, Organic compounds.

AD-412 835 Div. 4, 14
(TISTM/REB) OTS price $3.60

Yarsley Research Lab., Ltd. (Gt. Brit.).
INVESTIGATION OF POSSIBLE METHODS FOR PREPARING NOVEL SILICON-BASED MONOMERS AND POLYMERS.
Final technical rept., 1 June 62-31 May 63,
by N. C. Ross. 28 June 63, 30p.
Contract DA91 591euc2482
Unclassified report

Descriptors: (*Polymers, Silicon compounds), (*Silicon compounds, Polymers), (*Siloxanes, Copolymerization), (*Elastomers, Synthesis (Chemistry), Stability, Temperature, Grignard reactions, Molecular weight, Heat-resistant plastics.

This programme was initiated to synthesise polymers based on a silicon-carbon backbone which possess elastomeric properties combined with thermal stability. A major part of the programme has been devoted to the synthesis of block copolymers of silcarbane and siloxane structures. Low molecular-weight silcarbane polymers with functional end-groups were synthesised by silicon hydride-silicon vinyl addition reactions, using the monomers 4,4'bis (dimethylsilyl) diphenylether and 4,4' bis (vinyldimethylsilyl) diphenylether, and also by the condensation of 1,2 bis (chlorodimethylsilyl) ethane with the di-Grignard reagent of diphenylether. The end groups of the polymers were hydrolysed to silanol groups and condensation of the silcarbane chains was effected thermally. The block copolymers did not attain molecular weights greatly in excess of 5,000. Polydiphenyleneethersiloxane was synthesised in high molecular form by the catalytic condensation of 4,4'-bis (hydroxydimethylsilyl) diphenylether. Silcarbane polymers of various structures have been synthesised by reactions of the silicon-hydride addition type or by the reaction of chlorosilanes with difunctional Grignard reagents. The diphenylene-ether siloxane polymer, (-Si(CH3)2 - C6H4OC6H4 - Si(CH3)2-O-), showed outstanding stability. (Author)

AD-412 846 Div. 4
(TISTM/TCG) OTS price $1.60

Missouri School of Mines and Metallurgy, Rolla.
THE TRIVALENCY OF GALLIUM IONS FORMED DURING THE DISSOLUTION OF THE METAL IN ACIDS,
by M. E. Straumanis and K. A. Poush. July 63, 13p.
Contract Nonr2296 03
Unclassified report

Descriptors: (*Gallium, Solubility), (*Acids, Solvent action), Hydrochloric acid, Sulfuric acid, Perchloric acid, Ions, Electrolysis, Platinum, Anodes (Electrolytic cells), Cathodes (Electrolytic cell), Voltmeters, Quantitative analyses.

Gallium dissolves very slowly in diluted acids like HCl, H2SO4 and HClO4. The rate can be substantially accelerated if the metal is connected with a Pt electrode in the same solution. From the volume of the hydrogen developed the trivalency of Ga ions going into solution can be calculated. The same ionic charge is obtained from coulometric measurements using Ga amalgam as an anode. Ga disintegrates partially while it is going anodically into solution. The diameter of the smallest observable Ga particles is below 7 x 10 to the -5th power mm in diameter. If the solution is not cooled the formation of larger metallic spheres is observed. Disintegration explains the deviation from Faraday's law and the presence of the small particles - the reducing ability of the electrolyte. The postulation of Ga ions of lower valency is not necessary and their presence can not be proved. (Author)

AD-412 856 Div. 4, 22
(TISTM/EJH) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SPECTROSCOPIC INVESTIGATION OF THE POSSIBILITY OF ALDEHYDIC HYDROGEN-BONDING BETWEEN CYCLOTETRAMETHYLENE - TETRANITRAMINE(HMX) AND DIMETHYLFORMAMIDE(DMF); RESONANCE PHENOMENA IN DMF,
by Alexander H. Castelli, Delbert J. Cragle and Walter E. Fredricks. Apr 63, 15p.
DA Proj. 517 06 002
PA Technical memorandum no. 1217
Unclassified report

Descriptors: (*Molecular association, Complex compounds), (*Organic compounds, Explosive materials), (*HMX, Complex compounds), Organic nitrogen compounds, Spectra (Infrared), Resonance, Chemical Bonds.

The possibility of hydrogen bonding (HB) involving the aldehydic hydrogen (AH) of DMF in the crystalline complex molecule HMX-DMF has been investigated (Part I). Spectroscopic methods were used. DMF-d1 with deuterium as the AH was employed. The change in the vibrational stretching frequency of the AH of DMF does not indicate that such HB exists in the complex. Some observations are made concerning variations in intermolecular phenomena between gas and liquid phases of DMF (Part II). Spectroscopic methods were used. HB was found to play no part in these phenomena. The phenomena are explained in terms of a resonance mechanism. (Author)

AD-412 908 Div. 4, 25
(TISTM/TCG) OTS price $4.60

Emmanuel Coll. Research Language Center, Boston, Mass.
TRANSLATION OF ORGANIC COMPLEXES WITH CHARGE MIGRATION (Organicheskie kompleksy s perenosom zariada),
by V. P. Parini. 1962, 39p.
AFCRL ETR63 3 Unclassified report

Trans. from Uspekhi khimii, 31: 7, pp. 822-837, 1962.

Descriptors: (*Complex compounds, Organic compounds), (*Organic compounds, Complex compounds), (*Ionization potentials, Molecules), (*Bibliographies, Organic compounds), Electrical conductance, Electric potential, Magnetic properties, Paramagnetic resonance, Oxidation-reductoion reaction, Resistance (Electrical), Chemical reactions, Stability, Semiconductors, Ions, Electron, Excitation, Benzene, N-Heterocyclic compounds, Aromatic compounds, Organic nitrogen compounds, Hydrocarbons, Polycyclic compounds.

AD-412 976 Div. 4, 25
(TISTM/AMS) OTS price $2.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL RESEARCH ON THE EVAPORATION RATE OF A DROP OF LIQUID IN A STATIONARY HIGH-TEMPERATURE MEDIUM,
by V. M. Ivanov and Ye. V. Smirnova. 3 July 63, 22p.
FTD TT63 520 Unclassified report

Trans. from Novyye Metody Szhiganiya Topliv i Voprosy Teorii Goreniya, Izd. AN SSSR, Trudy Instituta Goryuchikh Iskopayemykh, Vol. XIX, pp. 46-58, 1962.

Descriptors: (*Evaporation, Liquids), (*Liquids, Evaporation), (*Drops, Liquids), Equations, Heat transfer, Organic materials, Hydrocarbons, Diffusion, Fuels, Fuel oil, Water, Controlled atmospheres, Test methods, Test equipment, Temperature, Geometric forms, Curved profiles.

AD-413 029 Div. 4
(TISTM/EJH) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
POLAROGRAPHIC BEHAVIOR AND LARGE-SCALE ELECTROLYSIS OF SOME ALKYLNITROSAMINES,
by Gerald C. Whitnack, Robert D. Weaver and Howard W. Kruse. June 63, 10p.
NOTS TP3253 Unclassified report

Descriptors: (*Organic compounds, Polarographic analysis), (*Electrolysis, Organic compounds), (*Hydrazine derivatives. Synthesis (Chemistry), (*Polarographic analysis, Organic compounds), Electrochemistry, Organic nitrogen compounds, Mercury, Solutions, Sulfuric acid, Cathodes (Electrolytic cells), Reduction (Chemistry), Amines.

The general behavior of dimethyl-, diethyl-, di-n-propyl-, and diisopropylnitrosamine was investigated at the dropping mercury electrode and the data obtained are discussed in a conventional polarographic manner. Diffusion-controlled waves were obtained in well-buffered media and in 20% ethyl alcohol solutions of either mineral or organic acids. Yields of approximately 75% of 1,1-dimethylhydrazine were obtained by the large-scale electrolysis of dimethylnitrosamine at a mercury cathode in an organic acid solution of 4 to 5 pH. In 3N sulfuric acid solution, dimethylamine, ammonia, nitrous oxide, and nitrogen were established as reduction products, along with 50% yields of 1,1-dimethylhydrazine. Different mechanisms are proposed and discussed for the reduction of the alkylnitrosamines in acid, neutral, and alkaline solutions. Data indicate that the course of the reduction is complex and depends upon pH. (Author)

AD-413 093 Div. 4, 20
(TISTM/TCG) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SELF-DECOMPOSITION OF C14-LABELLED ORGANIC COMPOUNDS. A REVIEW OF THE LITERATURE,
by Phillip Rochlin. July 63, 22p.
DA Proj. 599 04 011
PA TR3078 Unclassified report

Descriptors: (*Organic compounds, Labeled substances), (*Carbon compounds, Decomposition) (*Labeled substances, Organic compounds), (*Bibliographies, Organic compounds), Cholesterol, Cholines, Glucose, Sucrose, Amino acids, Thyroxine, Organic sulfur compounds, Radioactive isotopes, Explosive materials, Radiation chemistry, Dosage, Radioactive decay, Equations, Carbon, Purines, Carboxylic acids.

The literature on the self-decomposition of C-14-labeled organic compounds was reviewed. Factors causing self-decomposition and methods of reducing or minimizing this effect are discussed. Equations are given for calculating absorbed dose, percent decomposition, and G-values. All data have been recalculated on a common basis so that they may be compared. In general, no attempt has been made to consider the behavior of the various compounds when subjected to different forms of external radiation, as this has been adequately covered in other reviews. (Author)

AD-413 425 Div. 4
(TISTM/REB) OTS price $1.10

California Inst. of Tech., Pasadena.
CONFORMATIONAL STUDIES OF CYCLOBUTANE SYSTEMS,
by Joseph B. Lambert and John D. Roberts.
July 63, 6p. Technical rept. no. 24
Contract Nonr22026, Proj. NR055 388
Unclassified report

Descriptors: (*Organic compounds, Cycloalkanes), (*Stereochemistry, Cycloalkanes), Molecular structure, Dipole moments, Nuclear magnetic resonance.

Isolated attempts were made to detect the presence of nonplanarity in cyclobutane rings. Significant deviations from planarity were measured for cyclobutane, octafluorocyclobutane, octachlorocyclobutane, and bromocyclobutane. The results in the first two cases, however, have not been without controversy. It was the object of the present work to devise a fairly general, but still straightforward, method of detecting the presnece and determining the magnitude of puckering in substituted cyclobutane rings, and to ascertain whether the results could be interpreted in terms of an equilibrium between axial and equatorial conformations. (Author)

AD-413 467 Div. 4
(TISTM/REB) OTS price $1.10

Kent, State U., Ohio.
A NEW APPROACH TO MEASUREMENT OF DIPOLE MOMENT,
by R. Thomas Myers. 1963, 10p.
Contract AF49 638 641
AFOSR Rept. no. 5120 Unclassified report

Descriptors: (*Dipole moments, Measurement), Solutions, Solvents, Dielectric properties.

In the method introduced here interpolations, rather than extrapolations, are used, and the value obtained in solution for dipole moment is apparently the same as that in the gas phase, within the experimental error of measurements of the latter. The chief reason for inability to make a definite statement here is the discordant data for dipole moments. (Author)

AD-413 468 Div. 4
(TISTM/TCG) OTS price $1.10

Rochester U., N. Y.
THE PHOTOCHEMICAL PROCESS IN COMPLEX MOLECULES AND THE REACTIONS OF CERTAIN RADICALS.
Final rept.,
by W. Albert Noyes, Jr. 1 June 63, 5p.
Contract AF49 638 679
AFOSR Rept. no. 5093 Unclassified report

Descriptors: (*Photochemistry, Complex compounds), (*Complex compounds, Molecules), (*Organic compounds, Aliphatic compounds), Free radicals, Chemical reactions, Photons, Dissociation, Hydrogen, Ions, Decomposition, Excitation, Electron transition, Atomic energy levels.

AD-413 469 Div. 4
(TISTM/TCG) OTS price $1.10

Chicago U., Ill.
REACTIVE INTERMEDIATES IN CYCLOPROPANE CHEMISTRY.
Final technical rept.,
by W. G. Brown. 31 Dec 62, 6p.
Contract AF49 638 784
AFOSR Rept. no. 4875 Unclassified report

Descriptors: (*Organic compounds, Synthesis (Chemistry), (*Photochemistry, Organic (Compounds), Monocylic compounds, Chemical reactions, Decomposition, Pyrolysis, Exchange reactions, Deuterium, Isomeric transitions.

Studies were made of the chemistry of 1,1-dimethyl-2,3-dinitrocyclopropane, the first representative dinitrocyclopropane to have been made. Unlike the mono-nitro compound, the ring hydrogens are liabile to acetate ion, - catalyzed hydorgen - druterium exchange. With a stronger base, hydroxyl ion, the compound readily undergoes a ringe cleavage similar to those known for nitrocyclopropyl ketones. Further studies were made on the photochemical tranformations of aryl ketones containing cyclopropyl substituents, as well as analogous compounds with larger rings. The preliminary findings disclose patterns of photolytic reactions not hitherto exemplified. One example if the formation of 2-methyl-4-benzoyl-1-butene upon UV irradiation of 1-benzoyl-2,2-dimethyl-cyclopropane. (Author)

AD-413 758 Div. 4, 25
(TISTM/ODN) OTS price $2.60

Cornell U., Ithaca, N. Y.
ELECTRICAL AND MAGNETIC PROPERTIES OF POTASSIUM TUNGSTEN BRONZE AND RUBIDIUM TUNGSTEN BRONZE,
by M. J. Sienko and Sheila MacEnness Morehouse.
20 Sep 62, 20p.
Contract AF49 638 191
AFOSR 5003
Unclassified report

Descriptors: (*Tungsten compounds, Physical properties), (*Rubidium compounds, Physical properties), (*Potassium compounds, Physical properties), Electrical properties, Theory, Single crystals, Tungstates, Resistance (Electrical), Electrical conductance, Low temperature research, Experimental data, Complex compounds, Magnetic properties.

Single crystal conductivities were measured for K.4WO3 and Rb.32WO3 in the range 150 to 370 K. Carrier mobilities, which are somewhat higher than in the Li and Na tungsten bronzes, closely follow a T sinh squarred (theta/2T) dependence. Calculations on the basis of the theory of Howarth and Sondheimer strongly support the assumption that the thernal part of the carrier mobility in the tungsten bronzes is primarily determined by polar scattering from optical mode lattice vibrations. Magnetic susceptibilities were also measured at room temperature for Rb.26WO3 and K.23-.45WO3. Results are as prediceted by the Pauli-Peierls theory for quasi-free electrons. (Author)

AD-413 759 Div. 4
(TISTM/REB) OTS price $1.60

Mississippi U., University.
A QUANTITATIVE SPECTROPHOTOMETRIC STUDY OF INTERACTIONS BETWEEN IODINE AND ARYL METHYL SULFIDES IN CARBON TETRACHLORIDE,
by V. Ramakrishnan and P. A. D. de Maine.
1963, 19p.
Grant AF AFOSR62 19
AFOSR 4955 Unclassified report

Descriptors: (*Iodine, Complex compounds), (*Organic compounds, Complex compounds), Chemical reactions, Thermodynamics, Organic sulfur compounds, Aromatic compounds, Programming (Computers), Spectra (Visible and ultraviolet).

Mixtures of aryl methyl sulfides and iodine in carbon tetrachloride have two charge-transfer absorption bands with maxima located near 3050 A and between 3380 and 3525 A respectively. Computer analysis of spectrophotometric data for these systems at 20 and 45 C showed that (1) data collected between 3300 and 3600 A are consistent with the simultaneous reversible formation of two isomeric one:one complexes between the sulfide and iodine, and that (2) data between 2900 and 3100 A (the region where the sulfides absorb) cannot be explained by the simultaneous reversible formation of two isomeric one:one complexes. Only for the o-tolyl methyl sulfide-iodine complex do the mean molar absorptivities in the long wavelength band increases as the

temperature is increased. Thermodynamic and spectroscopic constants for the iodine complexes with thioanisole and with o-, m-, and p-tolyl methyl sulfides in carbon tetrachloride are given. Contact charge-transfer and charge-transfer theories are considered. (Author)

AD-413 765 Div. 4
(TISTA/AMS) OTS price $1.10

Minnesota U., Minneapolis.
VISCOSITY OF SOLUTIONS OF INTERACTING PARTICLES,
by George W. Woodbury, Jr., and Stephen Prager.
1963, 3p.
Contract AF49 638 720
AFOSR 4873 Unclassified report

Descriptors: (*Viscosity, Solutions), Equations, Diffusion, Stresses, Distribution, Particles, Mathematical analysis, Functions.

AD-413 874 Div. 4
(TISTM/ODN) OTS price $1.10

Kansas U., Lawrence.
STATISTICAL MECHANICAL THEORY OF TRANSPORT PROCESSES IN MIXTURES.
Final technical rept.,
by Richard J. Bearman. 13 July 63, 3p.
Grant AF AFOSR61 7
AFOSR Rept. no. 5128 Unclassified report

Descriptors: (*Mixtures, Transport properties), Theory, Electrolytes, Solutions, Statistical mechanics.

AD-413 930 Div. 4, 7
(TISTM/AM) OTS price $11.00

Physics Engineering Chemistry Corp., Boulder, Colo.
INVESTIGATION FOR THE PURPOSE OF IMPROVING THE EFFICIENCY OF UTILIZATION OF SOLAR ENERGY BY THE DECOMPOSITION OF WATER INTO HYDROGEN AND OXYGEN.
Final rept.,
by Ronald E. West, Hormoz Mahmoud, Donald G. Burkhard, Harumasa Ito and Robert S. Kirk.
May 63, 138p.
Contract AF19 604 8420, Proj. 6694, Task 66940
AFCRL 63 666 Unclassified report

Descriptors: (*Photochemistry, Solar radiation), (*Solar radiation, Water), Chemical reactions, Decomposition, Oxygen, Hydrogen, Ultraviolet radiation, Solutions, Acids, Energy conversion, Effectiveness, Ions, Sensitivity, Absorption, Iron, Cerium, Salts, Test equipment, Test method, Thallium, Mercury, Copper, Uranium, Chromium, Ionization potentials, Perchloric acid, Theory, Valence, Equations.

The sensitized photo-decomposition of water was studied, with the purpose of improving its efficiency as a means of solar energy conversion. A number of metallic cations and other materials were tested for sensitizer activity and, of these, only ceric, thallic, ferrous, iodide, and chromous ions do sensitize the reaction; the former two to yield oxygen, the latter three, hydrogen. In no case was the simultaneous production of hydrogen and oxygen observed. Quantum yields were determined, with substantial conversion of the sensitizer, and found to be of the order of 10 to minus 2; to 10 to minus 4. Initial yields were much higher. With the known sensitizers, this reaction does not utilize a sufficient fraction of the solar spectrum to be practical as a means of solar energy conversion. Ceric ions oxidize water to yield oxygen in the dark at elevated temperatures. The thermal reaction is catalyzed by platinized platinum whereas the photochemical reaction is not. Apparently the ceric-water reaction proceeds thermally and photochemically by different mechanisms. (Author)

AD-413 942 Div. 4
(TISTM/REB) OTS price $2.60

George Herbert Jones Lab., U. of Chicago, Ill.
THE FORMATION OF BIPHENYLS FROM DERIVATIVES OF BENZENE-1,4-DIAZOOXIDE; ELECTROPHILIC SUBSTITUTION AND THE CARBENE PROBLEM,
by Michael J. S. Dewar and K. Narayanaswami.
1962, 25p.
Contract Nonr212121
Unclassified report

Descriptors: (*Organic compounds, Substitution reactions), (*Pyrolysis, Synthesis (Chemistry)), Aromatic compounds, Polymers, Reaction kinetics, Decomposition, Deuterated compounds, Deuterium, Labeled substances, Chromatographic analysis.

AD-413 957 Div. 4, 25
(TISTM/REB) OTS price $8.60

Harvard U., Cambridge, Mass.
AN INVESTIGATION OF ORGANOSILAZANES BY BROAD-LINE NUCLEAR MAGNETIC RESONANCE,
by James R. Barrante. Aug 63, 90p.
Contract Nonr186613
Unclassified report

Descriptors: (*Silicone plastics, Nuclear magnetic resonance), (*Nitrogen compounds, Nuclear magnetic resonance), (*Organic compounds, Silicon compounds), Polymers, Molecular weight, Siloxanes, Chemical bonds, Temperature, Low temperature research.

Because nuclear magnetic resonance techniques have proved so useful in the study of the silicones, it naturally followed that they be used to study the new types of silazane polymers. The purposes of the investigation were (1) to compare the properties of the silazanes in general with those of the siloxanes, determining, if possible, the types and degree of molecular motion present, (2) to study effect of temperature on the internal motion, and (3) to analyze the effect of cross-linking on the properties of the polymers at low temperatures, the silazanes usually being considerably more cross-linked than the siloxanes through the trifunctional nitrogen atoms. Several pure compounds also were examined, including the ring compounds and some chain species of low molecular weight; moreover, the effect of methyl substitution of the nitrogen atoms also was studied. (Author)

AD-414 022 Div. 4
(TISTM/REB) OTS price $12.00

Johns Hopkins U., Baltimore, Md.
NEW MICROCATALYTIC CHROMATOGRAPHIC TECHNIQUE FOR STUDYING CATALYTIC REACTIONS AND CATALYTIC ACTIVITY OF METALS.
Final rept., 15 Aug 57-15 Oct 62,
by Paul H. Emmett. 15 Oct 62, 1v.
Contract AF18 603 129
AFOSR 4949 Unclassified report

Descriptors: (*Catalysis, Chromatographic analysis), (*Metals, Catalysis), (*Alloys, Catalysis), (*Organic compounds, Hydrogenation), Nickel alloys, Copper alloys, Nitrogen, Adsorption, Complex compounds, Ammonia, Synthesis (Chemistry).

AD-414 064 Div. 4
(TISTM/REB) OTS price $1.10

Washington U., Seattle.
DECOMPOSITION OF CHEMICALLY ACTIVATED ETHYL-d1 RADICALS,
by J. H. Current, B. S. Rabinovitch, C. A. Heller, and A. S. Gordon. 1 July 63, 7p. Technical rept. no. 13/2
Contract Nonr47714, Task NR051 217
Unclassified report

Descriptors: (*Organic compounds, Decomposition), Deuterated compounds, Ethanes (2 C), Reaction kinetics, Deuterium, Free radicals, Hydrocarbons.

5. COMMUNICATIONS

AD-411 767 Div. 5, 8
(TISTE/WA) OTS price $1.75

Electronic Warfare Div., Air Force Avionics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
PRINCIPLES OF SYSTEMATIC CODING FOR ERROR CORRECTION.
Rept. for Jan 62-Mar 63,
by Blinn W. Russell. June 63, 56p.
AF Proj. 4335, Task 433529
ASD TDR63 439 Unclassified report

Report on Applied Communications Research for Air Force Vehicles.

Descriptors: (*Coding, Digital systems), (*Digital systems, Coding), Communication theory, Model (Simulation), Reliability, Errors, Probability, Communication systems.

The report is essentially an elementary discussion of the principles of systematic, or ''group'' binary codes as used in digital type communications systems. Structure and characteristics of typical short codes are explained first in systematized arrangements called standard arrays and then are given additional physical and intuitive significance by a geometric model. A simple model of a one-way digital communication system is used to illustrate a complete single error correction encoding-decoding process from input signal to error corrected output. The importance and salient features of maximum likelihood detection are stressed. The cost and effectiveness of simple codes are discussed in general terms. Evaluation factors in common use are described and their advantages and disadvantages discussed. The problem of comparing the information transfer efficiency of coded and uncoded systems is considered and quantitative results are given for a couple of simple short codes. (Author)

AD-411 790 Div. 5, 8, 18
(TISTE/OHD) OTS price $8.10

Mitre Corp., Bedford, Mass.
GROUND-TO-AIR TRANSMITTER, ESS INSTALLATION MANUAL.
Dec 60, 1v. SR20
Contract AF33 600 39852
ESD TDR63 402 Unclassified report

Descriptors: (*Radio equipment, Radio stations), (*Antiaircraft defense systems, Handbooks), Instruction manuals, Design, Radio communication systems, Antennas, Radio transmitters, Electric cables, Electrical equipment, Wiring diagrams, Radio receivers.

This manual documents the installation of an experimental ground-to-air transmitter-receiver facility (GATR) for SAGE weapons control. The manual is divided into three chapters: Chapter 1-- Concept and Design; Chapter 2-- Installation and Functional Description; Chapter 3-- Equipment specifications. Each chapter is designed for a different pjrpose and is self-sufficient. Chapter 1 explains the purpose, history, and overall function of the GATR installation; Chapter 2 summarizes the overall design and describes the installation and interconnection of the functional units; Chapter 3 presents the electrical details of the MITRE-designed or modified equipment and gives the designation of government furnished and commercial equipment. (Author)

AD-412 330 Div. 5
(TISTM/AM) OTS price $8.60

Stelma, Inc., Stamford, Conn.
DEVELOPMENT OF TELETYPEWRITER AND RELAY TEST SETS UGM-1.
Final rept., 25 June 58-31 Jan 63,
by F. Barr. 31 Jan 63, 94p. Rept. no. 6
Contract DA36 039sc78120, DA Proj. 3 89 21 723
Unclassified report

Descriptors: (*Teletype system, Test equipment), (*Relays, Test equipment), Design, Test method, Operation, Analog-digital computers.

This report, which describes electrical and mechanical developments of the UGM-1 equipments in accordance with Signal Corps Technical Requirements SCL-1886, -1887, -1888, includes: Discussions of circuits and components considered for use, during the course of development, and evaluations of the approaches finally chosen for use in the equipment; Design-consideration details and test results that led to electrical and mechanical features incorporated in the equipment; Detailed logic discussions of the final circuitry used in the equipments. (Author)

AD-412 459 Div. 5, 8
(TISTE/CAM) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
SIMULATION EXPERIMENTS IN TWO-WAY CONTROLLED CARRIER TRANSMISSION,
by Ronald J. Massa. May 63, 45p.
Proj. 4610
AFCRL 63 159 Unclassified report

Descriptors: (*Communication systems, Troposphere), (*Simulation, Analog computers), Scattering, Propagation, Attenuation, Errors, Probability, Signal-to-noise ratio, Microwave communication systems, Radio communication systems, Control, Frequency shift keyers, Diversity reception, Radiofrequency power, Radiofrequency interference, Reduction.

A controlled carrier system, the power reductions due to controlled carrier transmission, and the results of an analog computer simulation demonstrating various aspects of controlled carrier operation are discussed. In addition, communication performance improvements in

tropospheric scatter systems that may be obtained through the use of controlled carrier are cited, and related to corresponding improvements obtained with diversity and coding. (Author)

AD-412 464 Div. 5
(TISTA/GEC) OTS price $2.25

Michigan U., Ann Arbor.
STUDY ON TELEMETRY AND RANGE SAFETY TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES.
Final rept., 1 Feb 61-31 Mar 62,
by M. H. Nichols and L. L. Rauch. June 63, 73p.
Contract AF33 616 7890, Proj. 4107, Task 410711
ASD TDR62 1073 Unclassified report

Descriptors: (*Phase locked communication systems, Telemeter systems), (*Telemeter systems, Phase locked communication systems), Pulse modulation, Coding, Demodulation, Frequency modulation, Aerospace craft, Guided missile ranges.

The report consists of four more or less independent monographs covering certain aspects of the areas of bit, word and frame synchronization for random nonreturn-to-zero PCM and improved demodulation of FM signals. (Author)

AD-412 849 Div. 5
(TISTM/BRW) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
THE DESIGN OF AIRBORNE RADIO RELAY COMMUNICATION SYSTEMS,
by Todd G. Williams. July 63, 19p.
RADC TDR63 278 Unclassified report

Descriptors: (*Radio relay systems, Design), (*Communication systems, Costs), Airborne, Numerical analysis, Equations.

If the channel capacity and reliability of, and the total distance to be spanned by an airborne radio relay communication system are specified, the system designer must choose values for relay vehicle reliability, number of redundant relay vehicles and the distance between relay vehicles in such a manner as to satisfy the specification. The problem considered in this report is that of selecting these values in such a manner as to satisfy the specification at minimum cost. An expression is derived for the cost of a minimum cost system. The effect of the specified and cost defined parameters on the cost of such a system is discussed. (Author)

AD-413 388 Div. 5, 1
(TISTM/AM) OTS price $7.60

Hazeltine Technical Development Center, Inc., Indianapolis, Ind.
GENERAL AVIATION TRANSPONDER.
Final engineering rept.
30 Oct 62, 68p. Rept. no. 6103
Contract FAA BRD 233, Proj. 108 8D
Unclassified report

Descriptors: (*Transponders, Design), Transmitter receivers, Theory, Modulators, Tests, Data, Mixers (Electronic), Temperature, Pulse discriminators, Sensitivity, Aircraft.

This report outlines the design and development of the Hazeltine General Aviation Transponder (GAT). Included are descriptions of the operation of the unit and an account of the engineering difficulties incurred, together with illustrations of the GAT system and unit schematics. (Author)

AD-413 461 Div. 5, 8, 28, 30
(TISTE/OHD) OTS price $6.60

Northeastern U., Boston, Mass.
STUDY AND INVESTIGATION OF SPEECH DATA.
Final rept.,
by L. Dolansky, J. T. Barrs, C. R. Howard, and C. Karis. 15 Mar 63, 61p.
Contract AF19 628 389, Proj. 4610, Task 461002
AFCRL 63 118 Unclassified report

Descriptors: (*Speech representation, Digital computers), (*Speech recognition, Intelligibility), (*Speech compression, Coding), (*Voice communication systems, Speech compression), Data processing systems, Test methods, Pattern recognition, Speech.

Speech signals processed by a Vocoder and the digital voice data processing system have been compared with clear-speech signals by means of intelligibility tests; the quantitative intelligibility degradation was measured under various conditions of Vocoder voicing, using varying numbers of quantizing levels for the reproduced signals. It was found that (a) the major decrease of intelligibility was attributable to the Vocoder processing; (b) the reduction of the number of quantizing levels had some effect upon listener confidence, but no noticeable effect upon intelligibility; (c) erroneous voiced responses to unvoiced sounds, processed by the Vocoder, could be eliminated in many cases by a suppression of the fricative-vowel transition region and (d) the elimination of the beginning part of initial voiceless fricatives in clear speech resulted in responses corresponding to other consonants, most frequently to voiced stops. (Author)

AD-413 471 Div. 5
(TISTB/AAR) OTS price $2.60

Michigan U., Ann Arbor.
CURRENT PROBLEMS IN SPEECH COMMUNICATION,
by Gordon E. Peterson. 1963, 29p.
Grant AF AFOSR62 302
AFOSR 5068
Unclassified report

Presented at the Communication Sciences Seminar, June 12, 1963, at the University of Florida.

Descriptors: (*Speech, Communication systems), Scientific research, Physiology, Neurology, Muscles, Respiration, Voice communication sytems, Theory, Acoustics.

AD-413 474 Div. 5
(TISTM/AM) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
A METHOD OF OBTAINING AND ANALYZING DIGITAL ERROR PATTERNS,
by Donald G. Iram and Walter R. Richard.
July 63, 13p.
Proj. 4519, Task 451903
RADC TDR63 255 Unclassified report

Descriptors: (*Teletype systems, Coding), (*Mathematical analysis, Data processing systems), Probability, Test methods, Errors, Data.

A method is described for obtaining error pattern statistics on dependent digital communications channels. Using this method, experiments were made on a tropospheric scatter channel. The

error statistics gathered are further analyzed to indicate the improvement possible on this channel by using a burst-error correction code. Curves are presented showing this improvement as a function of reduced information rate and digit block length. (Author)

AD-413 479 Div. 5, 8
(TISTM/AM) OTS price $7.60

Air Force Cambridge Research Labs., Bedford, Mass.
ACCURATE LOG AND INVERSE-LOG FUNCTION GENERATING CIRCUITS: FOR USE IN DIGITAL VOCODER PITCH CHANNEL,
by Lawrence V. Kriger. June 63, 66p.
Proj. 4610
AFCRL 63 186 Unclassified report

Descriptors: (*Electronic equipment, Circuits), (*Speech transmission, Electronic equipment), Diodes (Semiconductors), Functions, Theory, Mathematical analysis, Germanium, Data, Bonding, Gold, Resistance (Electrical), Networks.

A novel synthesis technique, empirical in nature, is developed for diode-resistance function generation circuits attaining accuracies higher than theoretically possible by classic methods of peicewise-linear approximation. By the technique, analog signals applied to a nonlinear function generating network transitionally switch diode-resistance network branches. Curvi-linear rather than piecewise-linear approximation segments are thus generated. This is achieved by resistive non-linear network attenuation techniques which take advantage of the transitional resistance states assimulated by a germanium diode during its switching cycle. The resulting network attentuation characteristic can thus be made to closely approximate a monotonic function. In particular, logarithmic and exponential (inverse-log) function generating techniques are discribed. To justify the empirical synthesis technique, a varied theoretical analysis is first carried out. Logarithmic and exponential functions are graphically and mathematically reviewed. A novel presentation of diode characteristics and their equivalent circuits is given. Classic function generating circuit theory is reviewed using a basic model from which the transitional-resistance model is then developed. Implementation of the dynamic models into the AFCRL digital vocoder and data processor is described including tables of quantum frequencies and voltages, calibration data and circuit diagrams. (Author)

AD-413 538 Div. 5, 1
(TISTM/AM) OTS price $13.50

Litton Systems, Inc., Canoga Park, Calif.
SIMPLIFIED PSK DATA TERMINAL.
Final rept.
June 63, 1v.
Contract ARDS616, Proj. 112 21 1D
Unclassified report

Descriptors: (*Phase shifters, Transmitter receivers), Design, Theory, Operations, Modulators, Circuits, Gates (Circuits), Test methods, Measurement, Amplifiers, Digital recording systems, Tests, Printed circuits, Data, Malfunctions.

This report describes a digital data terminal using a differentially coherent phase-shift keying modulation technique. The data terminal was developed to demonstrate the practicability of such a device for Federal Aviation Agency air to ground data transfer applications. In the design of the data terminal, primary emphasis was given to factors which would result in technical simplicity and, in subsequent developments, small size and weight, and low production cost. The data terminal, while considered a breadboard, is contained in a shock-mounted 1/2 ATR case and is constructed using plug-in printed circuit cards. (Author)

AD-413 612 Div. 5, 18
(TISTP/PCR) OTS price $7.60

International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 22, 21 Mar-20 Apr 63.
20 May 63, 64p.
Contract AF19 626 8
ESD TDR63 378 Unclassified report

Descriptors: (*Command and control systems, Strategic Air Command), Data transmission systems, Data processing systems, Display systems, Combat information centers, Communication systems, Digital systems, Launching sites, Compatibility, Instruction manuals, Ground wupport equipment, Computers, Maintainability, Guided missiles (Surface to surface), Strategic weapons, Tests, Air Force.

The System Test Facility (STF) is used effectively for demonstrations, simulated tests, and real tests on equipment installed in the STF. Data from these tests are used in plans for the 465L System. Activities grouped under the Data Transmission Subsystem include the following: On-site checkout of the EDTCC at Offutt has been completed, and is in progress at Westover. Four RCC's in the field were tested and three RCC's were investigated with the Offutt EDTCC. There was no significant testing of the DPC. A solution is proposed for the RFI problems in the DDC. Test specifications for AGE and computer programs for tests and operation are being prepared. Reliability and RFI testing are continuing on some centrals. (Author)

AD-413 741 Div. 5
(TISTM/AM) OTS price $2.60

Aerospace Information Div., Washington, D. C.
NONUNIFORM TRANSMISSION LINES.
10 July 63, 28p.
AID Rept. T63 96 Unclassified report

Trans. from Neodnorodnyye linii. Radiotekhnika, 6:5, pp. 38-46, Sep-Oct 1951, and Sintez neodnorodnykh liniy po zadannym chastotnym kharakteristikam. Radiotekhnika, 7:6, pp. 55-66, Nov-Dec 1952.

Descriptors: (*Transmission lines, Nonlinear systems), Theory, Networks, Differential equations, Design, Fourier analysis, Probability.

The theory of nonhomogeneous lines, which makes it possible to investigate nonhomogeneous lines with arbitrary variation in linear parameters (variation of parameters in terms of length), is a topic of this report. Methods of designing nonhomogeneous lines based on their given input or output frequency characteristics are discussed within the context of the author's theory of nonhomogeneous lines. It is shown that typical problems concerning wideband matching, filter lines and least reflecting smooth transitions are reducible to an integral equation which under certain supplementary conditions becomes a Fourier transform. (Author)

Division 5 - COMMUNICATIONS

AD-413 823 Div. 5, 13
(TISTE/WA) OTS price $12.50

White Electromagnetics, Inc., Bethesda, Md.
ARCHITECTURAL INTERFERENCE DATA.
Final rept.
20 Aug 63, 1v.
Contract AF30 602 2691, Proj. 4540, Task 454003
RADC TDR63 312 Unclassified report

Descriptors: (*Radiofrequency interference, Countermeasures), Underground structures, Design, Shielding, Bonded joints, Lightning arresters, Site selection, Harmonic analysis, Corrosion, Ground (Electrical), Radiation hazards, Handbooks.

This report covers the results of an investigation of the primary problems of bonding, shielding and grounding as related to potential interference phenomena such as corona, lightning, and harmonic generation. This report is presented in the form of a handbook which provides specific structural design which should be utilized to minimize interference associated with structures. The handbook material is presented in two major sections: (1) Construction above Ground, and (2) Construction below Ground. (Author)

AD-413 835 Div. 5, 15
(TISTM/TCG) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
M-ARY SIGNALLING AND BALANCED INCOMPLETE BLOCK DESIGNS.
Final rept.,
by Alfred S. Kobos, June 63, 11p.
Proj. 4519, Task 451903
RADC TDR63 256 Unclassified report

Descriptors: (*Communication systems, Digital systems), (*Signals, Coding), (*Coding, Matrix algebra), Communication theory, Errors, Probability.

A set of code words obtained by the cyclic permutation of binary sequences having auto-correlation functions with only two values is discussed. The relationships of this type of code to solutions of balanced incomplete block design problems and other mathematical constructs are presented. These codes consist of m words of m binary digits each. A simple m-ary system transmitting through white Gaussian noise is used to discuss error probabilities. Cases in which these codes can be shown to exist are noted, and a list of known codes with lengths less than 100 is provided. The advantages of signalling with this type of code, as compared to orthogonal code words, are discussed. (Author)

AD-413 982 Div. 5, 18, 1
(TISTM/AM) OTS price $2.60

Jansky and Bailey Div., Atlantic Research Corp., Washington, D. C.
RESEARCH ON ADVANCED DATA TRANSMISSION TECHNIQUES FOR AIRBORNE EARLY WARNING COMMUNICATIONS
27 Apr 61, 19p.
Contract AF18 600 1654
Unclassified report

Descriptors: (*Early warning systems, Design), (*Transmissions, Data), Probability, Statistical analysis, Programming (Computers), Data processing systems, Detection, Detectors, Meteors, Instrumentation.

Statistical data on certain performance characteristics are needed before design of practical meteor scatter data link systems can be accomplished. These data include the probability distributions for the time intervals between useful meteor bursts, data on meteor burst duration, seasonal and diurnal variations in average duty cycle, and the like. It is highly desirable to obtain these data for a range of frequencies, propagation path lengths, transmitted power, antenna gain characteristics, receiver sensitivities and bandwidths. (Author)

6. DETECTION

AD-412 306 Div. 6
(TISTP/JP) OTS price $6.60

ITT Federal Labs., Nutley, N. J.
SOLID STATE TACAN MONITOR.
Interim rept.,
by F. M. Griffee and J. B. Carocari. Feb 63, 56p.
Contract AF19 604 8459
ESD TDR63 220 Unclassified report

Descriptors: (*Monitors, Solid state physics), Modules (Electronic), Circuits, Radiofrequency generators, Transponders.

The initial design of a monitor for use as part of a solid-state TACAN ground system is discussed. Techniques developed for specific problem areas are covered, and experimental results obtained from a breadboard' model given: The possible implications of the program on future TACAN development are examined and recommendations made for the future course of development. (Author)

AD-412 402 Div. 6
(TISTP/JEA) OTS price $21.00

Denver Research Inst., Colo.
BALLOON FLIGHT OF JULY 16, 1962.
Flight data rept. no. 8, Vol. 1,
by David G. Murcray, James N. Brooks, Jay O. Green and Marie M. Working. 28 May 63, 1v.
Contract AF33 616 7633
Unclassified report

Descriptors: (*Infrared radiation, Background), (*Background, Measurement), Balloons, Radiometers, Automatic, Cooling, Indium compounds, Sulfides, Infrared detectors, Azimuth, Statistical data, Infrared filters, Balloon equipment.

The results obtained on a balloon flight made with an automatic programmed radiometer system is presented. The equipment was launched from Ft. Wainwright, Alaska, July 16, 1962. The radiometer was equipped with a liquid oxygen cooled InSb cell as a detector and measurements were made of the infrared background radiation in various wavelength intervals between 1.8 to 5.0 microns. (Author)

AD-412 742 Div. 6, 26
(TISTP/JEA) OTS price $4.60

Santa Barbara Research Center, Goleta, Calif.
PRODUCTION ENGINEERING MEASURE PbSe INFRARED DETECTORS - TYPE IR-200 FORM 2 PER SPECIFICATION SCS-34A.
Quarterly progress rept. no. 1, 1 Jan-31 Mar 63,
by G. H. Cook. 31 Mar 63, 1v. TP63 55
Contract DA36 039AMC01466
Unclassified report

Descriptors: (*Infrared detectors, Manufacturing methods), Design, Production, Lead compounds, Sulfides, Quality control, Military requirements.

The program planning has been completed and is described. Engineering drawings and specifications for the detector have been completed in their unreleased form. Test equipment requirements have been reviewed and USAEMA has been asked to clarify items in question. Engineering samples of the detector are in fabrication and should be delivered on schedule. Quality control and production engineering familiarization with the detector is being accomplished during the engineering sample fabrication. The familiarization period is being used to establish the basic requirements for quality control procedures, manufacturing sequence, methods and time determinations, and materials requirements. (Author)

AD-412 878 Div. 6
(TISTP/JEA) OTS price $21.00

Denver Research Inst., Colo.
BALLOON FLIGHT OF JULY 16, 1962,
by David G. Murcray, James N. Brooks, Jay O. Green, and Marie M. Working. 5 July 63, 353p.
Flight data rept. no. 8, vol. 2
Contract AF33 616 7633
Unclassified report

Report on Volume II UV Data.

Descriptors: (*Ultraviolet radiation, Background), (*Background, Measurement), Ultraviolet detectors, Radiometers, Balloons, Balloon equipment, Automatic, Ultraviolet filters, Scanning, Sun, Azimuth.

The results obtained on a balloon flight made with an automatic programmed radiometer system are presented. The equipment was launched from Ft. Wainwright, Alaska, July 16, 1962. The radiometer was equipped with a photomultiplier detector and measurements were made of the ultraviolet background radiation in the wavelength region between 200 millimicrons to 380 millimicrons. (Author)

AD-412 919 Div. 6, 26
(TISTP/JEA) OTS price $4.60

Texas Nuclear Corp., Austin.
PRODUCTION ENGINEERING MEASURE TO INVESTIGATE PROPERTIES OF INDIUM ANTIMONIDE AND TO PROVIDE 801-C6 INFRARED DETECTORS.
Quarterly progress rept. no. 1, 27 Dec 62-27 Mar 63,
by Robert L. Smythe and William L. Kolander. Aug 63, 37p. Rept. no. 04 63 4
Contract DA36 039amc01463E, Proj. S4089
Unclassified report

Descriptors: (*Infrared detectors, Manufacturing methods), Indium compounds, Antimony compounds, Resistance (Electrical), Noise, Production, Photoconductivity.

The properties of photoconductive indium antimonide are studied. Work is in three distinct phases. The first phase consists of work performed from start to shipment of the second group of engineering samples. The second phase is a pre-production phase in which finalized plans and processes are determined in preparation for the production run. The third phase is performance of the production run. (Author)

AD-412 987 Div. 6, 8
(TISTP/RD) OTS price $4.60

MITRE Corp., Bedford, Mass.
RADAR SYSTEMS AND TECHNIQUES DEPARTMENT ADVANCED DEVELOPMENT SUBDEPARTMENT QPR JULY 1, 1962 - SEPTEMBER 30, 1962.
June 63, 36p. Rept. no. PM22 18
Contract AF33 600 39852, Projs. 602 and 750
ESD TDR63 247 Unclassified report

Descriptors: (*Radar, Test equipment (Electronics), (*Radar equipment, Tests), Real time, Delay lines, Correlators.

Division 6 - DETECTION

This document reports the progress of the Advanced Development Subdepartment from July 1, 1962 to September 30, 1962. The work of the Subdepartment presently centers about the design and fabrication of an experimental test-bed radar facility which will be used to test and evaluate the applicability of certain radar techniques and components to high-power, long-range radar problems. Complementary activities include development work leading to improved radar components. (Author)

AD-413 131 Div. 6
(TISTP/AMS) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
PROPERTIES OF PHOTODETECTORS. PHOTODETECTOR SERIES, 58TH REPORT,
by W. L. Eisenman, A. B. Naugle and J. D. Merriam.
1 July 63, 22p.
NOLC 588 Unclassified report

Descriptors: (*Infrared detectors, Infrared photoconductors), (*Infrared photoconductors, Infrared detectors), Indium alloys, Arsenic alloys, Intermetallic compounds, Thermocouples, Lead compounds, Sulfides, Data, Detectors, Thermistors, Bolometers, Blackbody radiation.

This report presents the results of measurements made on eight photodetectors. It includes data sheets on an indium arsenide cell from Electro-Optical Systems; a thermocouple from Charles Reeder & Company; a thermistor bolometer from Servo Corporation of America; and lead sulfide cells from Infrared Industries, Inc., and Tupper Trent Company. It will be noted that in tests conducted on the thermocouple and thermistor bolometer, the blackbody response was measured at 500, 10; in all other cases it was measured at 500, 860. (Author)

AD-413 438 Div. 6, 12
(TISTW/PCR) OTS price $8.10

Boeing Co., Seattle, Wash.
FUNCTIONAL TEST REQUIREMENTS AND PROCEDURES FOR MISTRAM CHECKOUT EQUIPMENT,
by K. E. Lang, R. M. Newman, and E. L. Bland.
17 Feb 61, 1v. Document no. D2 9448 6
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile tracking systems, Guided missile ranges), Radar tracking, Radar equipment, Test methods, Checkout procedures, Checkout equipment, Guided missiles (Surface to surface), Strategic weapons, Transponders, Instrumentation, Radio beacons, Display systems, Control panels, Guided missile batteries, Test equipment, Waveguides, Power supplies, Voltage regulators, Mixers (Electronic), Calibration.

This document establishes the functional test procedures for the checkout equipment utilized in the MISTRAM Tracking System. MISTRAM will replace the present Azusa Radio Tracking System as the primary Range Safety Tracking System for the Minuteman Program at the AMR for missile #430 and ON. The equipment is intended for use in the R&D Program only and has no application in the operational weapon system. Section 2 of this document establishes the functional test requirements and describes the test procedures for the MISTRAM Transponder Subsystem Checkout Set. Section 3 of this document describes the test procedures for the Radio Beacon Test & Monitor Unit of the Instrumentation Test & Monitor Console. (Author)

AD-413 444 Div. 6, 8, 30, 33
(TISTE/OHD) OTS price $9.10

Auerbach Electronics Corp., Philadelphia, Pa.
BEACON PROCESSING EQUIPMENT DESIGN STUDY.
Final rept.
June 63, 50p. Rept. no. 108 107 9D
Contract FA WA4245
Unclassified report

Descriptors: (*Air traffic control systems, Data processing systems), (*Data processing systems, Radio beacons), Digital systems, Coding, Target recognition, Ranges (Distance), Azimuth, Specifications, Design, Computers, Computer storage devices.

A design is described for a beacon processing equipment (BPE) which is intended for inclusion in the air traffic control subsystem of the NAUS. The BPE accepts beacon video and generates a digital position and beacon code report for each target detected. The BPE contains two functional units: a reply detection unit and a target detection unit. The reply detection units senses reply code trains and generates a digital reply message containing range, azimuth and code for each target reply received on each radar sweep. The target detection unit correlates replies received on successive radar sweeps, performs target detection, determines center of azimuth, processes identity and altitude reply codes, and generates target reports. The design is straightforward and capable of being implemented with readily available components. A proposed specification for the BPE is provided in an Appendix. (Author)

AD-413 975 Div. 6
(TISTP/FEM) OTS price $3.60

IIT Research Inst., Chicago, Ill.
UNCOOLED IR DETECTOR FOR THE TEN MICRON REGION.
Quarterly rept. no. 1, 1 Mar-31 May 63,
by William D. Brennan. 10 June 63, 23p. Rept. no. ARF16032 3
Contract NOw63 0574c, Proj. 16032
Unclassified report

Descriptors: (*Infrared detectors, Design), (*Photoconductivity, Crystals), Cadmium compounds, Sulfides, Ionization, Heat, Particles, Light pulses, Optical equipment, Lenses.

A sample holder and flash apparatus were constructed for measuring the photoconductive response of cadmium sulfide crystals to microsecond pulses of light. The aim of this research is to obtain evidence of photoconductivity due to the thermal ionization of neutral particles generated by the light. There is some evidence that neutral particles have contributed to the photocurrent when certain sensitive locations of some crystals are illuminated. This is not exactly the anticipated behavior, and experiments now in progress are designed to remove ambiguities in the present evidence. The decay characteristics of the photoconductivity resulting from microsecond pulses of light proved to be a fruitful peripheral avenue of research. The interpretation of the measured decay rates is incomplete, but analysis of these rates promises to yield valuable information concerning lifetimes of electron traps. (Author)

7. ELECTRICAL EQUIPMENT

AD-411 858 Div. 7, 20, 12
(TISTA/GEC) OTS PRICE $3.60

Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC RESEARCH.
Quarterly progress rept. no. 5, 1 Jan-29 Mar 63, by C. M. Henderson. 29 Mar 63, 42p.
Contract AF33 657 7387, Proj. 8173, Task 817302 9
AEC Rept. no. NP12763 Unclassified report

Descriptors: (*Thermal reactors, Generators), (*Generators, Thermoelectricity), Nuclear power plants, Spacecraft, Feasibility studies, Operation, Electric power production, Temperature, Graphite, Molybdenum, Satellites (Artificial), Performance (Engineering).

An experimental model 5-watt (nominal) generator completed 2556 hrs of a sustained performance test at a hot-end temperature of 1200 C (+25 C-4 C), cold end at 714 C (+12 C-0 C), in a vacuum of (10 to the minus 5th power to 10 to the minus 6th power) mm Hg without degradation in power producing characteristics. The power/weight ratio of this generator, exclusive of heat source, ranged from 2.70 to 2.86 watt/lb. Tests at 1300 C and higher temperatures will be attempted with this generator. Graphite-ended segmented modules of n- and p-type thermoelectric materials to supplement p-type MCC 50, the thermoelectric material used in the 5-watt generator, were fabricated and partially evaluated. The first such p-n couple produced 250% more power than the p-type MCC-molybdenum couple used in the 5-watt generator. Improved emissive coatings and lightweight junctions between modules were produced. These developments suggest that an advanced experimental 50-watt generator having a power/weight ratio of 10-20 watt/lb is feasible. (Author)

AD-412 337 Div. 7
(TISTE/AAR) OTS price $2.75

Bendix Corp., Cincinnati, Ohio.
PIEZOELECTRIC CHARGER CD V-751X.
Final rept.,
by R. Lehman and John Stirnkorb. 9 July 63, 69p.
Contract OCD OS62 63
Unclassified report

Descriptors: (*Dosimeters, Generators), (*Piezoelectric crystals, Generators), Radio meter, Radiological dosage, Measurement, Electricity, Energy, Ceramic materials.

The design, development and fabrication of a radiological dosimeter charger, which uses piezoelectric ceramic crystals to generate the electrical energy and a lens system for external ambient light only, is described. This charger, presently designated OCD Item No. CD V-751X, has been developed as a possible replacement for the transistorized charger, OCD Item No. CD V-750, but requires no batteries; therefore, it has long shelf life. The effects of static stress on the piezoelectric properties of different ceramic materials were studied and basic formulas derived. Studies showed that the charge generated by the application of force to the piezoelectric material was directly proportional to force and to the material constant but was not dependent on the size. The material ''constants'' varied with stress, however, particularly at high stress values, so the size and shape affects the charge output indirectly. The charger is capable of using either natural sunlight or concentrated sources of light such as room light fixtures, flashlights or candles. All performance and environmental test requirements were passed on the prototype chargers except that for humidity. Modifications to the prototypes are suggested which should correct this humidity problem. (Author)

AD-412 340 Div. 7, 26, 11
(TISTE/JWS) OTS price $9.10

Rotron Mfg., Co., Woodstock, N. Y.
THE DEVELOPMENT OF GAS LUBRICANTED BEARINGS FOR USE IN BLOWER AND FAN MOTORS. PART I.
Final development rept., 7 June 62-7 June 63. 25 June 63, 97p.
Contract NObsr87522
Unclassified report

Descriptors: (*Gas bearings, Design), (*Journal bearings, Gas bearings), (*Thrust bearings, Gas bearings), Handbooks, Induction motors, Electric motors, Blowers, Environmental tests, Loading mechanics, Tables, Test equipment, Test equipment (Electronics), Mathematical prediction.

A manual for the design of hydrodynamic plain cylindrical journal and thrust bearings, included as part II of this report, has been completed, employing the latest information and techniques in this field. Special emphasis has been placed upon the prediction of half-frequency whirl by use of what is considered an improved analysis technique. To confirm the validity of the design methods, numerous tests were conducted on an instrumented rig, and a small (20 cfm) blower-motor assembly meeting the performance and environmental requirements of MIL-B-21399 were developed. The results of rig tests and qualification tests of the blower-motor assembly are summarized. (Author)

AD-412 415 Div. 7, 12
(TISTE/JBM) OTS price $5.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-112-1-26, AND QUALIFICATION SUPPLEMENT I THEREOF, ARRESTER SET, ELECTRICAL SURGE, LAUNCH CONTROL FACILITY,
by R. P. Carlton. 15 Feb 63, 55p. Document no. D2 13288 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Lightning arresters, Performance (Engineering)), (*Electronic equipment, Transients), Launching sites, Fungi, Environmental tests, Electric insulation, Electric discharges, Resistance (Electrical), Humidity, Shock resistance, Temperature, Vibration, Specifications.

This qualification report covers the qualification testing of the Arrester Set, Electrical Surge, MX-3854/GSW-4. (Author)

AD-412 597 Div. 7, 8
(TISTE/CAM) OTS price $10.10

Aero Geo Astro Corp., Alexandria, Va.
STANDARD POWER SUPPLY MODULES.
Final rept.
12 June 63, 114p.
Contract N62269 1448
NADC EL6322 Unclassified report

Descriptors: (*Power supplies, Modules (Electronics)), (*Modules (Electronics), Power supplies), Heat transfer, Cooling, Standards, Voltage regulators, Packaged circuits, Transistors, Reliability (Electronics), Weight, Costs, Wiring diagrams, Electrical impedance, Frequency converters.

Research is presented to provide supporting data for the development and standardization of modules and related cooling requirements, fabrication of modules and the design and development of modules in the form of repairable packages. A general discussion is given of background material attempting to show the intent, development, design, and philosophy of areas which were involved in the design, development, and construction of standard modules. Also presented is a detailed description of the design, development, fabrication, and test of the modules developed. The tests performed on the modules are described in detail and a photograph of each module is included to show the techniques used to achieve the various results. The data provided is intended as a guide--especially to those engineers desiring to reproduce the modules described herein--and as additional data for checking the results obtained under the contract. (Author)

AD-412 610 Div. 7, 8
(TISTE/OHD) OTS price $1.60

Astron Corp., East Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR CAPACITOR, VAPORIZED TEFLON. METALLIZED.
Quarterly rept. no. 2, 1 Apr-30 June 63,
by John G. Froemel. 30 June 63, 13p.
Contract DA36 039amc01459e
Unclassified report

Descriptors: (*Fixed capacitors, Halocarbon plastics), (*Metal films, Capacitors), Aluminum coatings, Glow discharges, Manufacturing methods, Polyester plastics, Sprays.

Glofilm material requires careful control in production. The problems encountered to date are ones which can be solved and the Radiation Research Corporation and the Astron Corporation are working in close cooperation to eliminate all the problems. The large number of capacitors now being wound are being subjected to various tests which will serve as an indication as to which areas are the most critical. The winding machine has proved itself capable of high speed operation. (Author)

AD-412 611 Div. 7
(TISTE/OHD) OTS price $1.60

Oak Mfg. Co., Crystal Lake, Ill.
MINIATURE ROTARY PANEL SEALED SWITCH.
Quarterly progress rept. no. 11, 13 Nov 62-12 Feb 63,
by Richard G. Fisk. 14 Mar 63, 9p.
Contract DA36 039sc81297
Unclassified report

Descriptors: (*Rotary switches, Manufacturing methods), Miniature electrical equipment, Tests, Specifications.

The testing associated with preproduction samples was completed. A total of 200 switches underwent test. As a result of the knowledge gained through this testing, an optimum specification was arrived at to describe the switches which will be furnished under this contract. A second benefit derived from these tests enabled Oak Manufacturing to establish manufacturing and inspection procedures to facilitate fabricating units which satisfactorily meet this optimum specification. (Author)

AD-412 612 Div. 7
(TISTE/OHD) OTS price $1.60

Oak Mfg. Co., Crystal Lake, Ill.
MINIATURE ROTARY PANEL SEALED SWITCH.
Progress rept. no. 12, 13 Feb-12 May 63,
by Richard G. Fisk. 29 May 63, 7p.
Contract DA36 039sc81297
Unclassified report

Descriptors: (*Rotary switches, Manufacturing methods), Subminiature electrical equipment.

Having benefit of previous manufacturing experience with this switch, a majority of the work was performed on a basis permitted only by benefit of having this knowledge. The effort was progressing quite satisfactorily as the period closed with some of the 1,000 pieces required having already been completed and submitted to our environmental lab for testing and evaluation. Obviously, the culmination of this contract will be accomplished in the next quarter and should be realized sometime around June 30, 1963. (Author)

AD-412 689 Div. 7
(TISTE/AAR) OTS price $3.60

Ion Physics Corp., Burlington, Mass.
FEASIBILITY AND DESIGN STUDY FOR ELECTROSTATIC GENERATORS.
Quarterly technical progress rept. no. 5,
16 Apr-15 July 63.
31 July 63, 28p.
Contract AF33 616 7230, Proj. 0 3 3145,
Task 61081
Unclassified report

Descriptors: (*Generators, Design), (*Electrostatic generators, Feasibility studies), Electrodes, Tests, Stability, Cleaning.

AD-412 728 Div. 7, 8
(TISTM/AM) OTS price $7.60

Malaker Labs., Inc., Mountainside, N. J.
BASIC RESEARCH ON FERROMAGNETIC SUPERCONDUCTORS.
Annual technical rept., 6 Feb 62-5 Feb 63,
by John G. Daunt, Charles J. Anderson, James J. Drautman, Richard Del Grosso, and Walter Baltensperger. 26 July 63, 65p.
Contract AF30 602 2708, Proj. 8503, Task 85006
RADC TDR63 304 Unclassified report

Descriptors: (*Ferromagnetic materials, Superconductors), (*Superconductors, Ferromagnetic materials), Low temperature research, Solid solutions, Gadolinium alloy, Test equipment, Test methods, Design, Electrical properties, Solenoids, Ruthenium alloys, Cerium alloy, Theory, Crystals.

The magnetic properties of a solid solution of 7.3% GdRu2-92.7% CeRu2 were studied by a.c. mutual inductance and search coil techniques in magnetic fields from zero to 6 koe, and over a temperature range from 1.2 K to 20 K. Three regions of magnetic behavior were found. Preliminary resistance measurements were carried out, and a transition found at a temperature corresponding to that of maximum magnetic moment. The results indicate that superconductivity and ferromagnetism exist in the sample. (Author)

AD-412 789 Div. 7
(TISTM/BRW) OTS price $2.00

Westinghouse Electric Corp., Pittsburgh, Pa.
AN INVESTIGATION OF SOLID-ELECTROLYTE FUEL CELLS.
Final rept., Feb 62-Apr 63,
by D. H. Archer, E. F. Sverdrup, W. A. English and W. G. Carlson. July 63, 66p.
Contract AF33 657 8251, Proj. 8173, Task 817303-17
ASD TDR63 448 Unclassified report

Descriptors: (*Fuel cells, Performance tests). (*Power supplies, Design). Space environmental conditions, Electrolytes, Electrodes, Ceramic materials, Zirconium compounds, Calcium compounds, Yttrium compounds, Oxides, Electrical properties, Seals (Stoppers). Solids, Oxygen, Hydrogen, Solid solutions.

The potential value of a solid-electrolyte fuel-cell system as an electrical power supply for aerospace applications is demonstrated by the performance of actual fuel-cell batteries. Three-cell units weighing 6 g and occupying 6.2 cu cm delivered 2.1 watts, operating at electrolyte current densities of 750 ma/sq cm and at an operating temperature of 1000 C. This represents achieved performance of 150 watts/lb and 9500 watts per cubic foot of actual battery components. The life of these batteries has not been completely evaluated. Systems studies show that self-sustaining power systems can be built weighing less than 50 lb/kw and occupying about 0.3 cu ft/kw of installed capacity in plant sizes of 0.5 kw or larger. (Author)

AD-412 865 Div. 7
(TISTE/JWS) OTS price $3.60

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY.
Supplement to quarterly rept. 15 May-15 Aug 63,
by R. T. Foley, J. Smit and H. H. Titus.
29p.
Contract NOw60 0362C
Unclassified report

Descriptors: (*Primary cells, Ammonia), Magnesium, Stainless steel, Corrosion, Pressure, Temperature, Tests, Electrical properties, Data processing systems, Statistical analysis.

Fabrication and fixture testing of 28-volt series battery packs are described. These units were tested in the new multi-cell test fixture described in the twelfth quarterly report. Different modes of activation and details of fabrication were evaluated in terms of voltage output, pressure rise, and temperature rise. These tests included a fractional factorial series of experiments, comprising five battery variables at two levels. An investigation of the effect on the magnesium-stainless steel couple of ammonia solutions was also initiated during this quarter. This study was undertaken to determine the extent to which galvanic corrosion contributed to the pressure and temperature rises within the battery. Additionally during this period a punch card code system for handling battery test data was devised. Details of the preceding as well as pertinent data are given in subsequent sections. (Author)

AD-412 905 Div. 7
(TISTM/AM) OTS price $8.10

Mallory Battery Co., North Tarrytown, N. Y.
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES.
Semi annual rept. no. 5, 1 Aug 62-15 Mar 63,
by Roger Goodman and Senior Engineer. 15 Mar 63,
82p. Rept. no. 5
Contract DA36 039sc78320, Task 3A99 09 002 02
Unclassified report

Descriptors: (*Primary cells, Alkaline cells), (*Alkaline cells, Tests), Tables, Low temperature research, Data, Zinc, Oxides, Mercury compounds.

The Cell Test Program under Signal Corps Contract No. DA-36-039 SC-78320 has advanced through the fifth semi annual report period in the testing and evaluation of primary alkaline cells and batteries of the zinc-alkaline-mercuric oxide system. Initial discharge data for cell types 625R, 1438R and 1450R at temperatures from minus 20 to 200 F and at 70 F. rates of discharge of 100 hours and less was completed. Type 650R cell was introduced in the program and partial initial discharge data is given. Monthly EMF readings covering this period for all nine cell types are presented. Delayed discharge after storage at temperatures from -20 to 160 F. was continued on eight cell types. The 650R cell was introduced in the program late in the report period and no storage data was obtained. (Author)

AD-412 927 Div. 7
(TISTE/AAR) OTS price $1.60

Astronetic Research, Inc., Nashua, N. H.
MODEL ARI 4103 COLLECTOR BIAS GENERATOR.
Final rept.,
by Gail C. Parker. 1 July 63, 10p.
Contract AF19 628 2420, Proj. 8617, Task 861701
AFCRL Rept. no. 63 492 Unclassified report

Descriptors: (*Generators, Detection), Particles, Instrumentation, Satellites (Artificial), Collecting methods, Weight, Design.

This Final Report covers development and production of a Bias Function Generator to be used with particle-detection instrumentation in a satellite. Two step-voltage outputs, from zero to +100 vdc or +1000 vdc and from zero to -100 vdc or -1000 vdc are available. Work on the unit described herein expanded and refined a previously designed low-voltage programmer. Designated the Model ARI 4103 Collector Bias Generator, the new versatile unit performs a wide variety of bias functions in a number of different applications, yet is small in size and light in weight. (Author)

AD-413 01, Div. 7, 17
(TISTW/BRW) OTS price $5.60

Linde Co., Div. of Union Carbide Corp., Cleveland, Ohio.
ELECTROLYTIC NIOBIUM AND NIOBIUM ALLOY CAPACITORS OF WET AND SOLID TYPES.
Quarterly rept. no. 4, 1 Apr-30 June 63,
by F. E. Cariou. July 63, 1v.
Contract NObsr87478, Proj. SR0080302
Unclassified report

Descriptors: (*Niobium, Capacitors), (*Niobium alloys, Capacitors), (*Electrolytic capacitors, Materials), Powder alloys, Tantalum alloys, Impurities, Anodes, Powder metals, Processing, Foils, Films, Single crystals, Electrical properties, Sintering, Density, Niobium compounds, Oxides, Electrolytes, Platinum alloys, Zirconium alloys, Tantalum compounds, Manufacturing methods.

Progress is reported on the development of 35-,

50- and 100-v niobium electrolytic capacitors of highest possible capacitance values, capable of full voltage operation at 85 C and with design objectives as listed in Military Specification MIL-C-26655 for: (1) electrical parameters, (2) environmental characteristics, (3) spatial configuration and dimensions, and (4) operating temperature range (-65 to +85 C). (Author)

AD-413 099 Div. 7
(TISTM/AM) OTS price $4.60

TAPCO Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
HIGH TEMPERATURE SOLAR THERMIONIC GENERATORS.
Quarterly technical progress rept., 15 Apr-31 July 63.
15 Aug 63, 44p. ER5464
Contract AF33 657 11169, Proj. 8173, Task 817305 24
Unclassified report

Descriptors: (*Thermionic converters, High temperature research), (*Cesium, Vapors), Test equipment, Test methods, Design, Instrumentation, Low pressure research, Solar radiation.

The two major goals of the program are: (1) to demonstrate that cesium vapor thermionic converters operating at temperatures above 1600 C can have a satisfactory life of at least one year at efficiencies greater than 15% and at power densities greater than 12 watts/sq cm; and, (2) to demonstrate that such high temperature converters can be incorporated into a cavity generator capable of sustained operation at the focal point of a solar concentrator. Toward these goals, a cavity type generator has been extensively tested under a solar flux range of 80 to 100 watts per sq ft during the first quarter of the program and good correlation of the generator solar performance with previous laboratory performance has been obtained. Further, an advanced thermionic converter design, fabrication and performance evaluation has been successfully accomplished and an additional three converters of this configuration are undergoing fabrication. (Author)

AD-413 298 Div. 7, 1
(TISTE/WA) OTS price $11.00

IIT Research Inst., Chicago, Ill.
APPLICATION OF MULTICONDUCTOR CABLE IN AIRCRAFT ELECTRIC SYSTEMS.
Final engineering rept., 15 Dec 61-15 June 63.
30 July 63, 133p.
Contract NOw620338, IITRI Proj. E173
Unclassified report

Descriptors: (*Electric cables, Aircraft), Reliability, Maintainability, Specifications, Tensile properties, Fatigue (Mechanics), Low temperature research, Mechanical properties.

A study of the feasibility of replacing conventional bundled harnesses with bulk multiconductor cable has shown that weight and volume reductions are possible. Further, it is found that increased flexibility and compactness result, enchancing vibration circumstances. The details of these circumstances and an analytical treatment of properties of bulk multiconductor cable are presented. This analytical study has shown the need for establishing relationships between material properties and geometric factors and cable flexibility. In addition, recommendations are made for improvements in the area of connector-to-cable transitions, mechanical and electrical properties of multiconductor cable, and connector design concepts. (Author)

AD-413 323 Div. 7
(TISTE/AAR) OTS price $21.00

Boeing Co., Seattle, Wash.
ENGINEERING DEVELOPMENT LABORATORY (EDL) TEST REPORTS, H&D GROUND POWER SUB-SYSTEM.
by G. W. Rowbotham. 18 July 63, 1v. Document no. T2 2564, Vol. 4.
Contract no. AF04 647 289
Unclassified report

Descriptors: (*Batteries & components, Power plants), Power, Launching, Motor generators, Control, Design, Calibration, Thermocouples, Cooling, Environmental tests, Battery chargers.

AD-413 405 Div. 7
(TISTM/TCG) OTS price $8.60

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63, by D. J. Doan and L. R. Wood. 30 Apr 63, 80p. Rept. no. 11
Contract DA36 039sc89188, Proj. 3A99 09 001
Unclassified report

Descriptors: (*Ammonia, Liquefied gases), (*Electrolytes, Ammonia), (*Batteries and components, Ammonia), Electrolytic cells, Electric potential, Electrical impedance, Capacitance, Polarization, Cathodes (Electrolytic cell), Low-temperature batteries.

Additional tests using the reduced cell width showed the design is functional. Additional effort to obtain information as to slow activation time of the -65 F batteries was carried out using single cells and batteries. Correlation of impedance decrease and voltage rise indicate the problem is either a gas layer or wetting. Intercell leakage is present but is not considered a major cause of slow activation. Initial trial of increasing the energy per unit weight and volume by adding additional cells has resulted in overheating at about 45% capacity, as compared to 73% initially. Best energy delivery was 4.5 w-h/lb. (Author)

AD-413 409 Div. 7
(TISTM/AMS) OTS price $4.60

Tapco Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
HIGH TEMPERATURE SOLAR THERMIONIC GENERATORS.
Quarterly technical progress rept. no. 1, 15 Apr-31 July 63.
15 Aug 63, 44p.
Contract AF33 657 11169, Proj. 8173, Task 817305 24
Unclassified report

Descriptors: (*Thermionic converters, Cesium), (*Cesium, Thermionic converters), Vapors, High temperature research, Power, Tests, Design, Performance tests, Life expectancy, Test methods, Data, Electric potential, Electric currents, Test equipment, Electrical properties, Solar radiation.

The two major goals of the program are: (1) to demonstrate that cesium vapor thermionic converters operating at temperatures above 1600 C can have a satisfactory life of at least one yeat at efficiencies greater than 15% and at power densities greater than 12 watts/sq cm; and, (2) to demonstrate that such high temperature converters can be incorporated into a cavity generator capable of sustained operation at the focal point of a solar concentrator. Toward these

goals, a cavity type generator has been extensively tested under a solar flux range of 80 to 100 watts/sq. ft. during the first quarter of the program and good correlation of the generator solar performance with previous laboratory performance has been obtained. Further, an advanced thermionic converter design, fabrication and performance evaluation has been successfully accomplished and an additional three converters of this configuration are undergoing fabrication. These converters will be subjected to sustained and cyclic life evaluations during the second and third quarter of the program. (Author)

AD-413 531 Div. 7
(TISTM/AM) OTS price $2.60

General Electric Co., Schenectady, N. Y.
THERMIONIC CONVERTER SURFACE CONDITIONS.
Quarterly technical progress rept. no. 2, 1 May-31 July 63.
Aug 63, 22p.
Contract AF33 657 10132, Proj. 8173, Task 817305 27
Unclassified report

Descriptors: (*Thermionic converter, Surfaces), (*Cesium, Vapors), Thermionic emission, High-temperature research, Tungsten, Oxygen, Oxidation, Tantalum, Oxides, Tungsten compounds, Films, Low-pressure research, Test equipment.

This report includes a short review of the program of work being undertaken and the status. During the second quarter the operation of a parallel-plane cesium converter having an emitter of oxygen-treated tantalum and a collector of molybdenum has been investigated. (Author)

AD-413 574 Div. 7
(TISTE/AAR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FORCED OSCILLATIONS IN AN ELECTRICAL CIRCUIT WITH A NONLINEAR CAPACITOR,
by V. N. Detinko and A. S. Petrov. 21 May 63, 13p.
FTD TT63 476 Unclassified report

Trans. from Izvestiya Vyshikh Uchebnykh Zavedeniy Fizika, No. 6, pp. 90-98, 1962.

Descriptors: (*Circuits, Oscillation), (*Capacitors, Circuits), Nonlinear systems.

AD-413 847 Div. 7, 26, 25
(TISTE/CAM) OTS price $2.60

National Cash Register Co., Dayton, Ohio.
FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
Quarterly rept. no. 5, 1 May-31 July 63,
by R. R. Chamberlin and J. S. Skarman. Aug 63, 21p.
Contract AF33 657 7919, Proj. 8173, Task 817301
Unclassified report

Descriptors: (*Photoelectric cells (Semiconductors), Semiconducting films), (*Manufacturing methods, Photoelectric cells (Semiconductors)), Photoelectric materials, Molybdenum, Foils, Phosphorescent materials, X-ray diffraction analysis, Impurities, Cadmium compounds, Sulfides, Phosphorus alloys, Bronze, Sprays, Hall effect, Measurements.

The objective of this work has been to continue the necessary applied research to obtain experimentally the necessary techniques for fabricating a thin film photovoltaic converter using a chemical spray process. The general feasibility of this chemical spray process was demonstrated. The initial investigation has been on cadmium plated spring steel and cadmium plated phosphorbonze. The foils used are approximately 8 mils thick to facilitate handling. (Author)

AD-413 882 Div. 7
(TISTE/AAR) OTS price $1.10

Astronetic Research, Inc., Nashua, N. H.
MODEL ARI 4013 COLLECTOR BIAS GENERATOR,
by Gail C. Parker. 1 July 63, 2p. Scientific report no. 1
Contract AF19 628 2420, Proj. 8617, Task 861701
AFCRL 63 811 Unclassified report

Descriptors: (*Generators, Detection), Particles, Instrumentation, Satellites (Artificial), Collecting methods, Weight, Design.

This Scientific Report covers development and production of a Bias Function Generator for particle detection instrumentation in a satellite. Two step-voltage outputs, from zero to +100 vdc or +1000 vdc and from zero to -100 vdc or -1000 vdc, are available. The developmental work expanded and refined a previously designed low-voltage programmer. Designated the Model ARI 4103 Collector Bias Generator, the resulting versatile unit performs a wide variety of bias functions in a number of different applications, yet is small in size and light in weight. (Author)

AD-413 916 Div. 7
(TISTM/M) OTS price $3.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 5, 1 May-31 July 63.
15 Aug 63, 26p.
Contract AF33 657 8970, Proj. 8173, Task 817303
Unclassified report

Descriptors: (*Fuel cells, Design), Transducers, Pressure, Test methods, Test equipment, Solenoids, Space environmental conditions, Hydrogen, Oxygen, Electrodes, Tests, Capillary tubes, Weightlessness.

During this reporting period, the testing schedule was greatly reduced because of lack of pressure regulators. The environmental testing which was started during the last quarter was delayed for this reason also. The work performed involved the following: Automatic start-up of the fuel cell package, continued calibration and testing of absolute pressure regulators, testing of solenoid valves and the check out and installation of a fuel cell package in a KC 135 aircraft for a zero-G flight test. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-411 761 Div. 8, 15
(TISTP/FEM) OTS price $8.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
CLASSIFICATION DECISIONS IN PATTERN RECOGNITION, by George S. Sebestyen. 25 Apr 60, 79p. TR381
Contract AF30 602 2112
Unclassified report

Descriptors: (*Pattern recognition, Statistical processes), (*Decision making, Automation), Classification, Learning, Sampling, Optimization, Mathematical models, Transformations, Matrix algebra.

The basic element in the solution of pattern-recognition problems is the requirement for the ability to recognize membership in classes. The automatic establishment of decision criteria for measuring membership in classes that are known only from a finite set of samples is discussed. Each sample is represented by a point in a suitably chosen, finite-dimensional vector space in which a class corresponds to a domain that contains its samples. Boundaries of the domain in the vector space can be expressed analytically with the aid of transformations that cluster samples of a class and separate classes from one another. From these geometrical notions a generalized discriminant analysis is developed which, as the sample size goes to infinity, leads to decision-making that is consistent with the results of statistical decision theory. A number of special cases of varying complexity are worked out. These differ from one another partly in the manner in which the operation of clustering samples of a class and the separation of classes is formulated as a mathematical problem, and partly in the complexity of transformations of the vector space which is permitted during the solution of the problem. The assumptions and constraints of the theory are stated, practical considerations and some thoughts on machine learning are discussed, and an illustrative example is given for the automatically learned recognition of spoken words. (Author)

AD-411 779 Div. 8, 7
(TISTE/CAM) OTS price $1.25

Harry Diamond Labs., Washington, D. C.
AUTOMATIC TESTING SYSTEM FOR VOLTAGE REGULATOR DIODES,
by Morris Brenner. 18 June 63, 48p.
HDL TR1145 Unclassified report

Descriptors: (*Voltage regulators, Diodes (Electron tubes)), (*Diodes (Electron tubes), Automatic), (*Cold cathode tubes, Diodes (Electron tubes)), Firing circuits, Measurement, Calibration, Instrumentation, Wiring diagrams, Circuits, Switching circuits, Capacitance, Test methods, Time.

Cold cathode devices are important and widely used electronic components for voltage control. A simple, automatic system was designed for measuring the three critical test parameters--voltage breakdown, energy transfer, the transfer time. These parameters are observed simultaneously and the results are recorded automatically on tape. The system can be used as an operating tool in both research and development and production. It has a number of advantages over conventional test methods. Performance data are more realistic, accuracy and reliability are greater, testing is faster, and there is a significant saving in costs and personnel. (Author)

AD-411 785 Div. 8
(TISTP/RLG) OTS price $9.60

Westinghouse Electric Corp., Baltimore, Md.
ELECTROLUMINESCENT FERROELECTRIC (ELF) SOLID STATE DISPLAY.
Final rept.
30 June 63, 1v.
Contract NObsr72782, Proj. NE09 1600 836 2
Unclassified report

Descriptors: (*Display systems, Design), (*Electroluminescence, Ferroelectricity), Ferroelectric materials, Panel boards (Electronics), Tests, Electric switches, Modules (Electronics), Circuit, Drives, Construction, Resolution, Operation, Signal generators, Timing circuits, Commutators, Plastics, Glass, Thin films (Storage devices), Powders, Phosphorescent materials, Maintenance, Frequency, Diodes, Electrodes, Electrostriction, Models, Quality control, Test methods.

The results of a study and investigation directed toward the design of an electroluminescent ferroelectric (ELF) display panel are described. As a result of this effort, experimental display panels utilizing electroluminescence and ferroelectricity have been constructed and evaluated. In addition, studies of the electroluminescent and ferroelectric materials as well as element switches were made to insure the use of optimum components in the ELF panels. Studies were performed on display panel resolution, gray scale, improved screen fabrication, and improved switching devices. Techniques of interconnection of modules to form a large area display have been formulated. Peripheral drive circuitry has been designed and developed for use with the ELF display panel. The circuitry can, however, be applied to a variety of cross-grid type displays with relatively little modification. (Author)

AD-411 803 Div. 8
(TISTP/FEM) OTS price $1.60

Electronics Research Lab., U. of Calif, Berkeley.
(No title).
Final rept. 1 June 59-31 May 62,
by A. R. Bergen and C. A. Desoer. 1 June 62, 11p.
Scientific rept. no. 11; Series no. 60, Issue no. 472
Contract AF19 604 5466, Proj. 5632, Task 56320
AFCRL 62 780 Unclassified report

Report on Research on Corrupted Data Processing Systems.

Descriptors: (*Control systems, Optimization), (*Nonlinear systems, Stability), Data processing systems, Probability, Statistical processes, Communication systems, Digital systems, Synchronization (Electronics), Radio receivers, Statistical analysis, Stochastic processes.

A brief description and conclusions are given on the work done at the Electronics Research Laboratory of the University of California for the Electronic Systems Division. Research on randomly time-varying systems, optimal control systems, and the stability of nonlinear control systems is reported. (Author)

AD-411 812 Div. 8, 22
(TISTP/AW) OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept., 1-31 May 63,
by Paul F. Mohrbach and Robert F. Wood.
31 May 63, 13p. Rept. no. P B1981 11
Contract N178 8087
Unclassified report

Descriptors: (*Explosives initiators, Hazards), (*Attenuators, Materials), Attenuation, Ferrites, Radiofrequency, Electric insulation, Sintering, Manufacturing methods, Broadband, Electromagnetic waves, Absorption.

To attain high attenuation in the design of experimental ferrite attenuators, it was found that those ferrites which have a low volume resistivity and high initial permeability generally are the best ones to use; however, the resulting low dc resistance and low voltage breakdown are not desirable. To eliminate these disadvantages, ferrites were insulated with ceramic sleeves having a high dielectric constant; the attenuation of insulated samples did not increase proportionally with length. Study showed that thin samples, separately insulated, combined in a composite length actually did give the predicted amount of attenuation. The attenuation of various lengths of ferrites at frequencies of 150, 250, and 500 Mc was measured. A graph is included which shows the relationship of attenuation versus sample length of uninsulated and insulated samples. Preliminary analysis of the graph seems to bear out previous tests in that thin insulated samples give the highest attenuation per unit length. Total attenuation of an insulated sample approaches a maximum value where further increase in its length has no effect on attenuation. The reason for this is not fully understood, but a reference is given which might shed more light upon the problem. (Author)

AD-411 831 Div. 8, 14, 26
(TISTE/PAR) OTS price $1.60

Western Electric Co., New York.
INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 16, 25 Nov 62-25 Feb 63,
by J. B. Rawls. 25 Feb 63
Contract DA36 039sc51268
Unclassified report

Descriptors: (*Fixed capacitors, Dielectric films), (*Dielectric films, Manufacturing methods), Capacitors, Varnishes, Films, Production, Tests, Carbonates, Cellulose acetates, Quality control.

During the past quarter, the pilot run test program for the 0.1 mfd cellulose acetate capacitors was completed. Pilot run samples of the 1.0 mfd size are being manufactured with the test program scheduled for the next quarter. Initial lots of polycarbonate film capacitors were produced during the past quarter. The principal problems encountered were raw material quality, lacquering and metalizing. (Author)

AD-411 834 Div. 8, 9
(TISTE/JWS) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
STUDY OF ADVANCED TECHNIQUES FOR COOLING VERY HIGH POWER MICROWAVE TUBES (VORTEX FLOW),
by Lester Feinstein and R. E. Lundberg. 19 Dec 62, 14p. Technical note no. 2
Contract AF30 602 2760
Unclassified report

Descriptors: (*Cooling, Electron tubes), (*Hydrodynamics, Cooling), Partial differential equations, Hydraulic systems, Vortices, Fluid dynamic properties, Bubbles, Motion, Pressure gages, Thermocouples, Manometers, Fluid flow, Photographic recording systems.

Further consideration was given to the applicability of Zuber's hydrodynamic theory to the vortex boiling problem. As a result, there appear to be areas requiring more investigation. These have to do with the relative velocities of the bulk fluid and the vapor, and the relative motion of the bubbles in the bulk fluid. The hydraulic system was completed. Test sections are being fabricated and instrumentation is being worked on. (Author)

AD-411 836 Div. 8, 6
(TISTE/JBM) OTS price $4.60

TRG Inc., Palo Alto, Calif.
DIRECTION FINDING TECHNIQUES FOR HF WIRE-GRID LENS ANTENNA,
by J. C. Greene and E. D. Sharpe. May 63, 37p.
Technical documentary rept. no. 3
Contract AF30 602 2742, Proj. 4505, Task 450502
RADC TDR63 51 Unclassified report

Descriptors: (*Lens antennas, Direction finding), (*Direction finding, Lens antennas), High frequency, Antenna radiation patterns, Beams (Electromagnetic), Antenna feeds, Phase measurement, Phase detectors, Demodulators.

This report presents a preliminary study of the direction finding properties of the HF wire-grid lens antenna. Theoretical sum and difference patterns for this antenna are given which are used in the evaluation of various electronic direction finding systems with respect to the accuracy obtainable and the circuit complexities required. The direction finding systems investigated are the monopulse, amplitude-comparison, and phase-comparison systems. (Author)

AD-411 862 Div. 8, 25
(TISTP/FEM) OTS price $1.10

California Inst. of Tech., Pasadena.
SUMMARY OF RESEARCH. I. VLF PROPAGATION STUDIES II. LASER STUDIES.
Final rept. for period ending 31 Mar 62.
31 Mar 62, 7p.
Contract AF18 600 1552
Unclassified report

Descriptors: (*Very low frequency, Propagation), (*Propagation, Antennas), (*Lasers, Interferometers), Antenna radiation patterns, Data, Diurnal variations, Ionospheric propagation, Whistlers, Cavity resonators, Resonance, Monochromatic light, Electromagnetic waves, Diffusion, Plasma medium.

AD-411 868 Div. 8
(TISTP/JEA) OTS price $9.60

Radiation Systems, Inc., Alexandria, Va.
INVESTIGATION OF A MULTIPLE BEAM SCANNING

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

CIRCULAR ARRAY,
by George G. Chadwick and John C. Glass.
31 Dec 62, 1v. Scientific rept. no. 1
Contract AF19 628 367, Proj. A 1035
AFCRL 63 136 Unclassified report

Descriptors: (*Coupled antennas, Design), (*Antenna components, Operation), Beams (Electromagnetic), Phase shifters, Antenna configuration, Antenna feeds, Excitation, Antenna radiation patterns, Amplitude modulation, Scanning.

One phase of a theoretical and experimental program directed toward the development of a multiple-beam or steerable cylindrical array is described. The object was to develop a cylindrical array which could provide high resolution coverage over 360 degrees of azimuth angle. The basic intent of the program was to theoretically analyze, and experimentally verify, an RSi conceived technique for reducing the problem of processing the antenna elements of cylindrical arrays to one analogous to the element processing of linear arrays. This equating of the array processes allows all of the techniques developed for linear arrays to be applied to cylindrical arrays. A partial listing of these processing techniques would include the synthesis of any desired far-field radiation patterns, the scanning of the synthesized patterns, or the multiple-beaming of these synthesized patterns. Hence, the cylindrical array may be used to provide steerable or multiple beams over 360 degrees in a horizon plane by employing the same scanning and multiple-beam processing developed for linear arrays. The distinction, of course, is that linear arrays, at the extreme, are limited to less than 120 degrees of coverage. (Author)

AD-411 913 Div. 8
(TISTE/JWS) OTS price $1.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR RUGGEDIZED TAUT BAND SUSPENSION PANEL METERS PER SIGNAL CORPS TECHNICAL REQUIREMENTS. SCS-43A DATED 15 NOVEMBER 1960.
Quarterly progress rept. no. 8, 1 Jan-31 Mar 63.
31 Mar 63, 7p.
Contract DA36 039sc85952
Unclassified report

Descriptors: (*Meters, Production), Springs, Suspension devices, Environmental tests, Performance (Engineering), Industrial equipment).

Efforts were directed to pre-production testing of all ranges of the 180 degree meters, with the exception of the 15-0-15 ua range. Pre-production testing of all meters is in progress. All sizes and meter ranges included in this contract have successfully passed the Group I and Group V tests of Specification SCS-43A. Reports covering the pre-production testing for ranges of 0-1 ma, and 0-50V of the 180 degree meters have been issued to USAEMSA. (Author)

AD-411 920 Div. 8, 12, 22
(TISTE/OHD) OTS price $4.60

Magnavox Co., Urbana, Ill.
SOLID STATE ARM SAFE DEVICE.
Final summary rept., 1 May-31 Dec 62,
by L. W. Ricketts. 18 Jan 63, 1v.
Contract DA11 0220RD4048
Unclassified report

Descriptors: (*Arming devices, Safety), (*Semiconducting devices, Warheads), Guided missile warheads, Electronic equipment, Transistor amplifiers, Trigger circuits, Timing circuits, Electronic switches, Crystal rectifiers, Integrators, Design, Environmental tests, Transducers, Strain gages.

This report covers the technical details of ten fabricated solid state arm safe devices as well as the tabulation of all the test data which has been evaluated during the past six month period. The design details have already been presented. Some of the pertinent facts will be repeated in order to present a unified coverage of the subject matter. The test data and the remarks on evaluation are presented in chronological order. In some of the first phases of tests flaws were indicated. This was particularly true in the transducer construction which had to be modified before a reliable unit could meet the vibration test requirements. The history, the specified ranges, the accuracy, and a comparative evaluation are given on the ten units. The results are presented in a tabular form and contains all the important parameters quantized. (Author)

AD-411 935 Div. 8, 12
(TISTE/CAM) OTS price $10.10

Boeing Co., Seattle, Wash.
STP III SPECIAL TEST REPORTS, ELECTRICAL AND ELECTRONIC SYSTEMS.
16 Apr 63, 116p. DN T2 3102 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Ground support equipment, Test equipment (Electronics)), (*Checkout equipment, Guided missiles, (Surface-to-surface)), Radio equipment, Electronic equipment, High frequency, Ultrahigh frequency, Noise (Radio), Electric potential.

AD-411 958 Div. 8, 25
(TISTM/BRW) OTS price $5.60

Servomechanisms Inc., Goleta, Calif.
ARMY/NAVY INSTRUMENTATION PROGRAM - PHOSPHOR RESEARCH.
Final rept.,
by E. J. Soxman. Dec 62, 49p. SMIR62 7
Unclassified report

Subcontract to Douglas Aircraft Co., Inc., El Segundo, Calif., Contract Nonr-107600.

Descriptors: (*Films, Electroluminescence) (*Phosphorescent materials, Vapor plating) Semiconductors, Dielectric films, Display systems, Photoconductivity, Photoelectric cells (Semiconductor), Zinc compounds, Sulfides, Crystal structure, Manganese compounds, Processing.

A research program was carried out involving a study of thin film electroluminescent cells. These cells were produced on glass substrates. They employed transparent SnO2 for one electrode and aluminum for the other. By a detailed study of the variables involved in the vapor deposition process, a simple, one-step, reproducible procedure was established for the preparation of ZnS:Mn phosphor films. This procedure is unique in not requiring excessively

high temperatures or any succeeding heat treatment. Through considerable advancement in the control of the deposition and substrate preparation, it was possible to fabricate numerous arrays of small cells, each approximately 0.025- x 0.025 -in square. Smaller cells leading to an even higher density display or ELPC configuration are now feasible. (Author)

AD-411 965 Div. 8
(TISTE/OHD) OTS price $10.50

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
A THEORY FOR BROADBAND VARACTOR PARAMETRIC AMPLIFIERS,
by Walter H. Ku. 31 Jan 63, 23p. Research rept. no. PIBMRI1091 62
Contract AF30 602 2213
RADC TDR63 41 Unclassified report

Descriptors: (*Parametric amplifiers, Theory), (*Varactor diodes, Broadband), Fourier analysis, Mathematical analysis, Sequences, Series, Complex variables, Matrix algebra, Sidebands, Gain.

This thesis is concerned with the development of a general and rigorous broadbanding theory for varactor parametric amplifiers. Fundamental gain-bandwidth limitations of a varactor parametric amplifier are obtained which are independent of the equalizer. Results obtained in this theory lead to the design and synthesis of broadband varactor parametric amplifiers. The circuit considered in this thesis is that of linear variable capacitors embeded in an arbitrary, passive, lossless environment in which the signal frequency and one of the sideband frequencies can exist. In the course of developing a broadbanding theory, some fundamental inherent properties of a parametric device are revealed. The first is that the varactor, when embedded in an arbitrary, passive environment, presents an impedance which can be characterized by a positive function rather than a positive-real function. The second and more important inherent property is that, due to the frequency-coupling action of the variable capacitor, the scattering coefficient at the varactor port is quadratic in nature. A broadbanding theory has been obtained, taking into account both of these properties. Some realizability conditions are presented which are indicative of the inherent properties of a parametric device. (Author)

AD-411 967 Div. 8, 26
(TISTE/JWS) OTS price $8.10

Delco Radio Div., General Motors Corp., Kokomo, Ind.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N1358A TRANSISTOR.
Quarterly progress rept. no. 4, 30 Jan-30 Apr 63, by J. C. Kuhns. 30 Apr 63, 1v.
Contract DA36 039sc86725
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Semiconductors, Surface properties), Germanium, Crystal growth, Chemical milling, Furnaces, Test sets, Automatic, Heat treatment, Thickness, Electrical properties, Reliability (Electronics), Environmental tests, Failure (Mechanics), Tables, Production.

As of April 30, 1963, of the 17 active process and equipment programs, 8 are completed and in production use, 6 are installed and undergoing production trials, 1 is currently being installed and 2 are in process development stages. Failure rates of Milestone II test were included in the previous report and graphs of the parameter distributions are included in this report. Preliminary information from Milestone III transistors is reported and the status of Milestone IV transistors construction is reviewed. Also, additional manufacturing test results and special accelerated test results are reported. The failure analysis program has continued to yield information as to the nature of failures and provides a quantitative measurement of the various failure modes. The analytical-empirical surface study programs have provided additional experimental results. Actions now under way for production changes are based upon some of these results. Additional electron probe work has presented dramatic pictorial evidence and suggests new approaches for future study of the sources, effects, and elimination of surface materials. (Author)

AD-411 984 Div. 8
(TISTE/JWS) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
RF SENSITIVITY OF CONTROLLED RECTIFIERS,
by Richard J. Sanford. June 63, 16p.
Task RREN04 004 212 1 and Task RMMO22 006 212 1
NOL TR63 56 Unclassified report

Descriptors: (*Crystal rectifiers, Radio-frequency interference), (*Radiofrequency interference, Crystal rectifiers), Sensitivity, Silicon, Gates (Circuits), Tests, Low pass filters, Frequency, Attenuators, Transistors, Semiconductor devices.

The RF sensitivity of the silicon controlled rectifier is described, as are ways of decreasing this sensitivity. These principles are applied in a circuit which protects electro-explosive devices against low, medium, and high frequency radio signals but presents negligible resistance to the DC firing signal. (Author)

AD-411 994 Div. 8
(TISTP/RLG) OTS price $8.10

Electronics Research Lab., U. of Calif., Berkeley.
A STATISTICAL ANALYSIS OF THE SYNCHRONIZATION OF DIGITAL RECEIVERS,
by H. Kaneko. 11 Apr 62, 79p. SR12;S60 I446
Contract AF19 604 5466, Proj. 5632, Task 56320
AFCRL 62 938 Unclassified report

Descriptors: (*Phase-locked communication systems, Pulse communication systems), (*Synchronization (Electronics, Statistical analysis), Communication theory, Probability, Errors, Signals, Sampling, Matched filters.

The probability of error of certain digital transmission systems is investigated, under the condition that the transmitter-receiver synchronization is imperfect. It is assumed that the receiver is the Bayes receiver that would be optimum were the synchronization perfect. It is further assumed that a synchronizing signal is transmitted separately from the information-bearing signals, and that the sum of the two signal powers is constrained to a given value. The conditional error probability for a

given synchronization error is evaluated for two particular binary systems, one using bipolar rectangular pulses and the other using unipolar cosine-squared pulses. The optimum synchronizer for the case of a sine-wave synchronizing signal is analyzed. The average error probability is then calculated by averaging the conditional error probability, given the synchronization error, over the distribution of synchronization error for this synchronizer. This average error probability is then minimized with respect to partition of the available power between the synchronizing and information channels. A detailed analysis and curves are given for the case of bipolar rectangular information signals. (Author)

AD-411 995 Div. 8
(TISTE/CAM) OTS price $2.60

Technical Research Group, Syosset, N. Y.
AMPLIFICATION BY RESONANCE SATURATION IN MILLIMETER WAVE CAVITIES,
by Benjamin Senitzky and Sylven Cutler. 23 May 63, 23p. Technical note no. 3
Contract AF30 602 2744, Proj. 175
RADC TDR63 253 Unclassified report

Descriptors: (*Cavity resonators, Amplifiers), (*Amplifiers), Millimeter waves), Electromagnetic waves, Measurement, Radiofrequency oscillators, Sidebands, Amplitude modulation, Hydrogen compounds, Cyanides, Theory, Gases.

A resonant cavity filled with HC12N14 gas was used to obtain amplification of electromagnetic radiation of 3.4 mm wavelength. An incoming radiation spectrum consisting of a local oscillator component which is sufficiently intense to saturate the 3.4 mm rotational resonance of the gas and weak sidebands (information signal) is reflected from the gas-filled, 3/4 inch diameter, 6 inch long cylindrical cavity. Under certain conditions, the non-linear properties of the gaseous medium can be used to yield a stable information signal gain of 20db. (Author)

AD-411 999 Div. 8
(TISTE/JWS) OTS price $4.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-121-3-1-13, AND QUALIFICATION SUPPLEMENT I THEREOF, RELAY ASSEMBLY, DUMMY DECODER,
by R. P. Carlton. 16 Jan 63, 42p. Rept. no. D2 9808 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Relays, Tests), Identification, Performance (Engineering), Human engineering, Environmental tests, Life expectancy, Radiofrequency interference.

AD-412 257 Div. 8
(TISTE/AAR) OTS price $8.60

Microwave Devices Lab., U. of Utah, Salt Lake, City.
(No title).
Consolidate quarterly rept., 1 Jan-31 Mar 63. 31 Mar 63, 93p. TR MDL Q4
Contracts Nonr1288 05 and AF04 647 745
Unclassified report

Descriptors: (*Electron beams, Scientific research), (*Microwave equipment, Laboratories), Dielectrics, Masers, Amplifiers, Plasma physics, Measurement, Exhaust gases, Rocket motors.

The broad purpose of the research activity reported herein is to extend the useful frequency spectrum into the range from microwave frequencies to optical frequencies and to improve existing devices and techniques in the microwave spectrum. (Author)

AD-412 341 Div. 8, 31
(TISTE/AAR) OTS price $9.60

Radio Corp. of America, Harrison, N. J.
OPTIMIZATION OF SILICON-GERMANIUM THERMOELECTRIC MODULES FOR TRANSPORTATION CORPS SILENT BOAT DESIGN.
May 63, 101p.
ARTRECOM TR63 17 Unclassified report

Descriptors: (*Modules (Electronic), Thermoelectricity), Design, Environmental tests, Boats, Silicon alloys, Germanium alloys, Water, Cooling, Heat.

This study has been to design, fabricate and evaluate water-cooled thermoelectric modules which will operate in an air environment, in line with TRECOM requirements, for a silent-boat power source, utilizing RCA-developed SiGe alloys and assembly techniques. (Author)

AD-412 350 Div. 8, 14, 26
(TISTE/PAR) OTS price $1.60

Western Electric Co., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 16, 25 Nov 62-25 Feb 63,
by J. B. Rawls. 25 Feb 63, 16p.
Contract DA36 039sc81268
Unclassified report

Descriptors: (*Fixed capacitors, Production), (*Dielectric films, Fixed capacitors), Capacitors, Varnishes, Films, Carbonates, Cellulose acetates, Quality control, Tests, Manufacturing methods.

During the past quarter, the pilot run test program for the 0.1 mfd cellulose acetate capacitors was completed. Pilot run samples of the 1.0 mfd size are being manufactured with the test program scheduled for the next quarter. Initial lots of polycarbonate film capacitors were produced during the past quarter. The principal problems encountered were raw material quality, lacqureing and metalizing. (Author)

AD-412 404 Div. 8
(TISTE/JWS) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
FREQUENCY REPEATABILITY OF CRYSTAL IMPEDANCE METER TS-683/TSM,
by W. Bowerman. May 63, 14p.
Task 3A99 15 007 02
AELRDL TR2366 Unclassified report

Descriptors: (*Meters, Electrical impedance), Quartz resonators, Aging (Materials), Calibration, Frequency, Test methods, Errors, Crystal ovens.

Quartz crystal units, operated within the 10- to 90-Mc frequency range, were subjected to repeated frequency measurements after simulating recalibration of Crystal Impedance Meter TS-683/TSM through readjustment of the oscillation amplitude level and test set frequency under calibration conditions, i.e., with a resistor substituted for the crystal. Generally, it was found that the oscillation frequency of plated AT resonators is critically dependent upon drive, the internal 0-150 microamperes meter cannot be used to adjust drive levels within accurate enough limits, and with a standardized procedure, frequency repeatability of this type C.I. meter (except for frequencies above 75 Mc) is better than one times ten to the minus seven power. (Author)

AD-412 405 Div. 8, 25
(TISTP/WH) OTS price $3.60

Florence U. (Italy).
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF CYLINDRICAL OR TOROIDAL DIFFRACTION REFLECTORS, HAVING A WIDE APERTURE AND FIELD ANGLE, OPERATING WITH DIFFERENT FREQUENCIES AT DIFFERENT FIELD ANGLES.
Final technical rept. 1 Apr 62-1 Apr 63,
by V. Russo. 1 Apr 63, 26p.
Contract DA91 591EUC2266
Unclassified report

Descriptors: (*Reflectors, Antennas), (*Antennas radiation patterns, Microwaves), Reflection, Diffraction, Diffraction gratings, Optics, Diffraction gratings, Propagation.

The research reported in this paper is concerned with cylindrical diffraction-reflector antennas, with circular mean cross-section. The first problem was to find how to vary the frequency with field angle. The antenna has been studied within the approximation of parageometrical optics. (Author)

AD-412 424 Div. 8
(TISTE/CAM) OTS price $11.00

Amersil Quartz Div., Engelhard Industries, Inc., Hillside, N. J.
QUARTZ SPIRAL DELAY LINE.
Final technical rept.,
by H. Mack Thaxton. Sep 62, 137p.
Contract AF30 602 2438, Proj. 4506, Task 45359
RADC TDR62 553 Unclassified report

Descriptors: (*Delay lines, Quartz), (*Quartz, Ultrasonic radiation), (*Ultrasonic radiation, Propagation), Geometric forms, Feasibility studies, Signal-to-noise ratios, Theory, Model tests, Impedance matching, Analysis, Bessel functions, Mathematical analysis, Electroacoustic transducers.

The investigations described concern research designed to discover the feasibility of ultrasonic propagation in quartz media. The purpose of the investigations was that of determining the feasibility of bending optical quartz rod into various geometric forms for maximum delay time and minimum space requirements. A second purpose was to determine the feasibility of direct propagation of Rayleigh and shear waves in the geometric form of the media studied, and the practical requirements for propagation. A third purpose was that of developing, theoretically or practically, methods for obtaining specified characteristics in the transmitted and received wave form or pulse. A fourth purpose required the determination of the feasibility of productively manufacturing the specific geometric form of quartz rod determined by the investigations. The goals of attainment established, initially, for these investigations were accomplished. (Author)

AD-412 481 Div. 8, 25
(TISTP/FEM) OTS price $22.50

Office of Naval Research, Washington, D. C.
INVESTIGATION OF NONLINEAR CONTROL SYSTEMS, PART 4. METHOD OF HARMONIC LINEARIZATION,
by Nicholas Minorsky. Mar 63, 1v.
Unclassified report

Descriptors: (*Control systems, Theory), (*Nonlinear systems, Oscillation), Stability, Transformations, Differential equations, Nondifferential equations, Equations, Partial differential equations, Accelerometers, Stochastic processes, Statistical functions.

AD-412 487 Div. 8
(TISTP/FEM) OTS price $4.60

Electronic Associates, Inc., Princeton, N. J.
EXPLORATORY PROGRAMMING STUDIES FOR IONOSPHERIC RAY TRACING.
Final rept.
8 Oct 62, 31p.
Contract AF19 604 7294 , Task Order no. 460302
Unclassified report

Descriptors: (*Electromagnetic waves, Whistlers), (*Analog computers, Propagation) (*Ionospheric propagation, Geometry), (*Programming (Computers), Models (Simulations), Simulation, Ionospheric propagation, Electron density, Frequency, Radio waves, Modulation, Low frequency, Audiofrequency, High frequency, Amplifiers, Circuits, Servo amplifiers, Diodes, Differential equations, Partial differential equations.

The development of preliminary analog computer programs for the solution of the two dimensional electromagnetic ray path equations is discussed. A simplified form of the equations is presented. A preliminary program was used for exploratory purposes. The information so obtained was used to aid in selecting the appropriate co-ordinate system for the equations in regard to optimal analog computer operation. Circuit diagrams, typical computer output plots, and the specialized forms of the equations used at low frequencies (5 kc.) and high frequencies (14 meg.) are included. (Author)

AD-412 507 Div. 8
(TISTE/OHD) OTS price $19.75

New York U., N. Y.
PROCEEDINGS OF THE HIGH-POWER MICROWAVE TUBES SYMPOSIUM HELD AT THE HEXAGON, FORT MONMOUTH, NEW JERSEY ON 25 AND 26 SEPTEMBER 1962.
VOLUME I.
1963, 319p.
Contract DA36 039sc89076
Unclassified report

Descriptors: (*Electron tubes, Microwave equipment), (*Klystrons, Radiofrequency power), (*Traveling wave tubes, Symposia), (*Electron tube parts, Radiofrequency power), Broadband, Modulators, Design, Focusing, X band, Extremely high frequency, Electron guns, Electron beams, S band, Waveguide windows, Resonators, L band, Theory.

Contents: A Broadband Megawatt Hollow Beam Multicavity Klystron; The Multiple-Beam Traveling-Wave Klystron; The Design of Wide Band Traveling-Wave Klystron; Modulator Design Considerations; Super-Power Generation by Linear Beam Tubes; The Biased-Gap Klystron; The Electromagnetic Amplifying Lens: Progress and Potentialities; Improved Performance Characteristics of Megawatt TWT's; A Megawatt X-band TWT Amplifier with 18% Bandwidth; High-Power CW Amplifier for 50-56 Gc Frequency Range; A 100 Gc High-Power Backward-Wave Oscillator; Characteristics of High-Perveance Hollow-Beam Guns for Super-Power Tubes; Application of Magnetron Injection Guns in High-Power Microwave Tubes; The Current and Velocity Distributions in a Velocity-Modulated, Brillouin-Focused Electron Beam; Measurement of the Surface Temperature of a Solid Under Electron Bombardment; Design for a Broadband, S-Band, Very-High-Power Crossed-Field Amplifier; High-Power Waveguide Windows; Super-Power Resonant Ring; High Average Power Microwave Window Study at L-Band; Dual Stage Amplitron for Super-Power.

AD-412 510 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR MECHANIZATION OF HIGH-RELIABILITY CAPACITORS.
Quarterly rept. no. 1, 31 Dec 62-31 Mar 63,
by E. Burke and W. F. Bell. 31 Mar 63, 12p.
Contract DA36 039amc01460E
Unclassified report

Descriptors: (Paper capacitors, Manufacturing methods), Reliability (Electronics), Industrial production, Machines, Quality control.

Effort is presented to provide mechanized production equipment to manufacture high-reliability paper-plastic capacitors. Work on the design of the machines was initiated. Experiments were begun to determine ways and means of assembling the capacitors. (Author)

AD-412 518 Div. 8
(TISTP/FEM) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tec., Lexington.
THE GUIDE WAVELENGTH OF CYLINDRICAL WAVEGUIDE OF ARBITRARY CROSS SECTION AND A COMPUTER PROGRAM FOR CALCULATING VALUES,
by R. N. Assaly. 20 May 63, 18p. Technical rept. no. 313
Contract AF19 628 500
Unclassified report

Descriptors: (*Waveguides, Design), Equations, Electric fields, Electrical impedance, Integral equations, Frequency, Geometric forms, Partial differential equations, Digital computers, Programming (Languages).

A method based on the variational principle is given for determining the cutoff wavelength of a waveguide whose cross-section configuration is arbitrary within the bounds of certain restrictions. A number of values were calculated for some of the more common waveguides and are shown. The results should be accurate to four significant figures except for the ridge waveguide where the assumed field configuration is in poor agreement with the actual field. In addition, a FORTRAN program for the IBM 7090 computer is given. (Author)

AD-412 534 Div. 8
(TISTP/FEM) OTS price $4.60

Dewey, G. C. and Co., Inc., New York.
A STUDY OF CORRELATOR BEHAVIOR USING ''NON-STATIONARY'' SIGNALS. PART II.
17 June 63, 38p. R127 1
Contract Nonr315800
Unclassified report

Descriptors: (*Signals, Detection), (*Correlation techniques, Signal-to-noise ratio), Noise, Radio interference, Simulation, Radio signals, Gain, Circuits, Environmental tests, Models (Simulations), Modulators, Data processing systems, Instrumentation, Display systems, Audio amplifiers, Attenuation, Noise generators, Filters (Electromagnetic wave), Clipper circuits, Mathematical models.

An experimental investigation of the cross-correlation gains of an analog and a clipper correlator has been carried out. The signals and noise used in this study we have characterized as being non-stationary. An attempt has been made to compare experimentally determined gains for the case of small signals buried in noise with those predicted theoretically. (Author)

AD-412 556 Div. 8, 20
(TISTE/JWS) OTS price $4.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
PULSED NUCLEAR RADIATION EFFECTS ON ELECTRONIC PARTS AND MATERIALS,
by W. Schlosser, C. P. Lascaro, and J. Key.
Sep 62, 45p.
DA Task 3A99 15 003 01
AELRDL TR2306 Unclassified report

Descriptors: (*Coaxial cables, Radiation damage), (*Fixed resistors, Radiation damage), (*Magnetic cores, Radiation damage), (*Electric wire, Radiation damage), Ferrites, Nuclear reactors, Photographs, Tables, Dose rate.

The results of a recent series of experiments conducted on electronic parts at the Sandia Pulsed Reactor Facility (SPRF) are discussed. Cables, resistors, and ferrite cores were included in the program. Four cables including RG-62A/U, RG-59B/U, RG-81/U, and a twisted pair line cord were exposed in various geometries, circuits, and applied voltages. Exposed also were 100-ohm, 1-kohm, 10-kohm and 100-kohm carbon film resistors, a 100-ohm wire wound resistor, as well as manganese-zinc and nickel-zinc ferrite cores. Peak induced currents observed in cables were: +3000 to -2650 microamp in looped RG-81/U, +600 to -2500 microamp in looped RG-62A/U, +300 to -380 microamp in looped RG-59B/U, +400 to -1650 microamp in looped twisted pair, +80 to -90 microamp in straight potted RG-26A/U, and +800 to -500 microamp in straight unpotted RG-62A/U cable.

Low-value resistors appeared quite stable, but resistors greater in value than 10 kohm showed a spurious and inconsistent behavior, attributed largely to lead cable efforts. The measurements on cables and resistors seem to bear out the fact that reliable data cannot yet be obtained for many exposed component parts because of the unpredictable behavior of the cables used for signal transmission. (Author)

AD-412 557 Div. 8
(TISTE/OHD) OTS price $1.60

Knights, James, Co., Sandwich, Ill.
PRECISION GLASS CRYSTAL UNITS.
Quarterly progress rept. no. 2, 1 Dec 62-28 Feb 63,
by Robert E. Christian and Roger E. Bennett.
28 Feb 63, 14p.
Contract DA36 039sc90698, Proj. 3A99 15 004
Unclassified report

Report on Research and Development of Precision Glass Crystal Units in the Frequency Range of 5 to 10 mc.

Descriptors: (*Resonators, Crystal oscillators), (*Glass, Crystal oscillators), (*Crystal holders, Frequency stabilizers), (*Frequency stabilizers, Glass), (*Quartz resonators, Precision finishing), Standards, High frequency, Manufacturing methods.

Data on resistance vs. contour, and spurious response attenuation, and frequency vs. contour is given for 6 mc third overtone units, together with some additional information on 5 mc third overtone units. (Author)

AD-412 622 Div. 8
(TISTE/CAM) OTS price $9.10

Aeronautical Electronic and Electrical Lab.,
Naval Air Development Center, Johnsville, Pa.
STANDARD POWER SUPPLY MODULES.
Final rept.
12 June 63, 104p.
Contract N62269 1807
NADC EL6325 Unclassified report

Descriptors: (*Power supplies, Modules (Electronics), (*Modules (Electronics), Standardization), Packaged circuits, Maintainability, Voltage regulators, Frequency converters, Direct current, Switching circuits, Transistors, Processing, Test methods, Cooling, Heat transfer.

A consolidated report is presented on thr results achieved to provide supporting data for the development and standardization of modules and related cooling requirements, fabrication of modules, and the design and development of modules in the form of repairable packages. A general discussion is given of background material attempting to show the intent, development, design, and philosophy of areas which were involved in the design, development, and construction of standard modules. Also a detailed description is given of the design, development, fabrication, and test of the modules developed under the contract. The tests performed on the modules are described in detail and a photograph of each module is included to show the techniques used to achieve the various results. The data provided is intended as a guide --- especially to those engineers desiring to reproduce the modules. (Author)

AD-412 631 Div. 8, 7
(TISTE/JBM) OTS price $3.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE, GENERAL PURPOSE.
Quarterly progress rept. no. 15, 1 Jan-31 Mar 63,
by Jerome G. Burns. 31 Mar 63, 37p.
Contract DA36 039sc81283
Unclassified report

Descriptors: (*Fixed resistors, Production), *Production, Fixed resistors), Life expectancy, Reliability (Electronics), Failure (Mechanics), Tests, Electric currents, Films, Performance (Engineering), Tables.

Efforts were continued on the establishment of a production facility with capacity necessary to manufacture a minimum of 35,000 each of 1/4 watt (RC-07) and 1/2 watt (RC-20) resistors per eight (8) hour shift. Reliability testing was completed after one year's testing. During the one year's reliability load life testing, only the RC-07 .27 megohm and RC-20 .24 megohm ranges developed a sufficient number of failures to establish a Weibull plot. All other ranges had zero failures except the RC-20 .48 megohm which had one failure. The Weibull plot for the RC-20 .24 megohm and the RC-07 .27 megohn shows a probability of surviving 2000 hours of .96 and .91 respectively. All seven RC-20 ranges were processed and submitted to Pilot Run testing. The first three RC-07 ranges (50 ohm, 10K ohm, and .5 megohm) are being screen tested prior to official Pilot Run testing. (Author)

AD-412 638 Div. 8, 22
(TISTP/AW) OTS price $2.60

Laboratories for Research and Development,
Franklin Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Monthly progress rept. no. 11 for May 63,
by Norman P. Faunce and Paul F. Mohrbach. May 63, 18p. Rept. no. P B1980 11
Contract N178 8102
Unclassified report

Descriptors: (*Explosives initiators, Radiofrequency), (*Probes (Electromagnetic), Explosives initiators), Radiation hazards, Electromagnetic waves, Sensitivity, Waveguide slots, Micrometers, Transmission lines, Standing-wave ratios, Penetration, Waveguide couplers, Hazards, Electromagnetic fields.

An adjustable probe assembly was designed for use with the slotted line. It has a probe travel of almost one full inch, extending the range of loads measurable by the voltage min-max power technique. After calibrating the new probe at 9.4 Gc, the system power transfer factor was determined for the 10 Mc firing system when terminated by a MARK 1 MOD 0 Squib. Indications are that the base of this squib is relatively lossy, and that the power transfer is on the order of .85 to .95. A rough measure of the squib's firing level is needed for a more detailed analysis of the data. Initial firing attempts resulted in a damaged collet. An improved design is being made up of drill rod instead of brass. An EBW test program was prepared. Application of this program to the XM6 and XM8 squibs will be documented in a special report, and no further mention will be made in this series of reports. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-412 654 Div. 8
(TISTE/JWS) OTS price $2.60

RCA Defense Electronic Products, Princeton, N. J.
APPLIED RESEARCH PROGRAM ON HIGH-TEMPERATURE RADIATION-RESISTANT SOLAR-CELL ARRAY.
QQuarterly technical progress rept. no. 4, May-Jul 63.
31 Jul 63, 23p. Rept. no. AED R2043
Contract AF33 657 8490, Task 817301-16
Unclassified report

Descriptors: (*Solar cells, Manufacturing methods), (*Adhesives, Solar cells), Gallium alloys, Arsenic alloys, Honeycomb cores, Aluminum, Tests, Temperature, Vacuum, Mechanical properties, Thickness, Semiconducting films, Diffusion, Epitaxial growth, Impurities, Zinc, Chemical milling, Tables, Equations, Measurement, Metal coatings, Radiation damage.

Contents:
Gallium arsenide cell development and fabrication; Array design and testing; Summary, Array design, Module design, Fixture design, Materials test and selection, Prototype panel, Radiation testing; Thin-film gallium arsenide investigation, Thin-film diffused-junction solar cells, Thin-film grown-junction solar cells, Properties of evaporated metallic contacts on GaAs, Analysis, Measurements.

AD-412 672 Div. 8, 25
(TISTP/WH) OTS price $1.10

Western Ontario U. (Canada).
A RACETRACK MICROTRON FOR MILLIMETER AND SUB-MILLIMETER WAVE GENERATION,
by H. Froelich and E. Brannen. 1963, 2p.
Contract 62 172
AFOSR [illegible] Unclassified report

Descriptors: (*Microwaves, Millimeter waves), (*Electron beams, Synchrotrons), Oscillation, Cavity resonators, Electrons, Electron accelerators.

AD-412 679 Div. 8, 25
(TISTP/FEM) OTS price $1.60

Cruft Lab., Harvard U., Cambridge, Mass.
PULSE PROPAGATION INTO WATER,
by Hans J. Schmitt. 18 Mar 63, 16p. Technical rept. no. 405
Contract Nonr1866 26, Proj. NR371 015
Unclassified report

Descriptors: (*Propagation, Pulse modulation), (*Water, Propagation), Sodium compounds, Chlorides, Experimental data, Electrolytes, Diffusion, Molecules, Attenuation, Electromagnetic waves, Plasma medium, Sea water, Radiators, Transients, Dielectrics, Communication systems, Electric fields, Radio interference.

The transmission of short unidirectional plane-wave pulses into water and solutions of sodium chloride was investigated. The time sequence of the transient response for incident pulses with a duration of several nanoseconds is observed at various depths in the electrolyte. The dispersion of the pulse is mainly due to the ionic conductance of the solution. For very rapid polarizing forces the relaxation associated with the hindered rotation of the water molecules also contributes to the dispersion. Unlike the exponential attenuation of sinusoidal signals in conducting media, for short pulses the maximum response ultimately follows an inverse cube law with increasing depth. The experimental results are compared to the calculated transient response obtained from an approximate theory. The agreement is excellent. (Author)

AD-412 712 Div. 8
(TISTE/JBM) OTS price $1.60

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF LOW NOISE TRAVELING-WAVE TUBES. PHASE II. ENVIRONMENTALIZATION.
Monthly status letter no. 16, 1 May-1 June 63,
by A. C. Ashley. 1 June 63, 8p.
Contract NObsr81227
Unclassified report

Descriptors: (*Traveling wave tubes, Noise (radio)), L band, S band, C band, X band, Environmental tests, Processing, Vacuum apparatus, Focusing, Magnets, Performance (Engineering), Packaged circuits, High altitude, Life expectancy, Shock resistance, Temperature, Vibration.

Efforts were continued on the development and environmentalization of low noise traveling wave tubes for operation at L-, S-, C- and X-bands. The most significant progress was obtained at X-band. Two tubes, one with a maximum noise figure of 10.1 db and one with a maximum noise figure of less than 10 db, have passed temperature, altitude, vibration, and shock tests and were being made ready for shipment at the end of the period. The results at L-, S-, and C-bands were not as encouraging as at X-band. The S-band processing problems continued to prevent the completion of tubes for shipment and for the final environmental and life tests. The C-band vacuum envelopes, which had performed well in the prototype package during the previous period, failed to pass preliminary tests when installed in the final package. The L-band environmentalization was hampered by the same problems that have slowed the S-band effort. (Author)

AD-412 756 Div. 8
(TISTE/WA) OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
TEST SET, ELECTRICAL OUTPUT, FUZE, MK 378 MOD 0: DESCRIPTION AND OPERATION.
15 July 63, 20p.
NAVWEPS rept. 8153 Unclassified report

Supersedes NAVWEPS rept. 5988, AD-236 607.

Descriptors: (*Test sets, Electronic equipment), (*Electronic equipment, Test sets), Design, Switching circuits, Firing circuits, Electronic switches, Fuze functioning elements.

This report presents a description of the Test Set, Electrical Output, Fuze, Mk 378 Mod 0, and gives detailed instructions for its operation. The set was developed for use in factory acceptance testing of the Switch, Firing, Electronic, Mk 73 Mod 1 and Mod 2, which is one of three major components that constitute the Fuze, Guided Missile, Mk 317 Mod 1 for the SPARROW III AAM-N-6a and -6b guided missiles. (Author)

AD-412 759 Div. 8
(TISTP/FEM) OTS price $2.60

Ministry of Aviation (Gt. Brit.).
BIBLIOGRAPHY ON SERVOMECHANISMS (CLOSED-LOOP SYSTEMS).
Aug 63, 19p.
MOA TIL BIB52 29 Unclassified report

Descriptors: (*Bibliographies, Servomechanisms), (*Servomechanisms, Control systems), Sensitivity, Feedback, Flight control system, Noise, Optimization, Nonlinear systems, Attitude control systems, Automatic, Torgue, Third films (Storage devices), Spectrophotometers, Servo amplifiers, Magnetic amplifiers, Analysis, Synthesis, Instrumentation, Pressure, Temperature, Stability.

AD-412 762 Div. 8, 17, 30
(TISTE/JWS) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
SOME COMMENTS ON STRAIN GAGE TECHNIQUES FOR DETERMINING MICROSTRAIN.
by R. D. Carnahan and J. E. White. 20 June 63, 11p. Rept. no. TDR169 3240 31TN1
Contract AF04 695 169
SSD TDR63 113 Unclassified report

Descriptors: (*Strain gages, Measurement), (*Metals, Deformation), Strain (Mechanics), Temperature, Elasticity, Electric bridges, Tensile properties, Plasticity, Alloys.

The use of strain gages in the measurement of strains in the vicinity of 10 to the minus 6th power is discussed. Observations of an anomalous anelastic behavior apparently associated with small temperature changes, which accompanies the unload portion of a load-unload microstrain test, are discussed. (Author)

AD-412 773 Div. 8
(TISTB/AAR) OTS price $1.10

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Syosset, N. Y.
DESIGN AND DEVELOPMENT OF INDICATOR MODULE MOD 2.
Monthly progress rept. no. 2, 1 June-1 July 63, by I. McRae. 1 July 63, 3p.
Contract DA30 069AMC170(A)
Unclassified report

Descriptors: (*Modules (Electronic), Design), Electronics, Electronic equipment, Engineering, Tests.

AD-412 793 Div. 8
(TISTE/JMB) OTS price $10.10

Florida U., Engineering and Industrial Experiment Station, Gainesville.
ASYMPTOTIC ERROR CODING BOUNDS FOR THE BINARY SYMMETRIC CHANNEL WITH FEEDBACK.
Scientific rept. no. 1, by Edward J. Weldon, Jr. 1 Apr 63, 122p.
Contract AF19 628 431, Proj. 5632, Task 563204
AFCRL Rept. no. 63 122
Unclassified report

Descriptors: (*Feedback, Communication theory), (*Coding, Errors), Probability, Communication systems.

Various asymptotic upper and lower bounds are calculated for linear (parity check) codes used with the Binary Symmetric Channel (BSC) with feedback. The feedback channel is taken to be noiseless and capable of instantaneous transmission. Two types of feedback are considered: (1) Decision Feedback, in which case one bit is fed back for each word transmitted in the forward channel, and (2) Information Feedback, in which case each received binary digit is fed back to the transmitter. The bounds calculated herein indicate that the best variable-length code has a higher probability of erroneous decoding than the best fixed-length code in which the feedback is used to vary the number of information symbols per word. They also indicate that the best code used without feedback has a higher probability of erroneous decoding than the best code used with decision feedback, which in turn has a higher probability of erroneous decoding than the best code used with information feedback. (Author)

AD-412 807 Div. 8
(TISTE/JWS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC ELECTRONIC MULTIPOINT INSTRUMENT FOR CONTROLLING AND REGULATING TEMPERATURE,
by A. Kh. Udovichenko, G. I. Reshetov and others. 22 June 63, 5p.
FTD TT63 430 Unclassified report

Trans. from Russian Patent No. 147044 (Appl. No. 669289/26), pp. 1-3, 6 June 1960.

Descriptors: (*Temperature control, Temperature sensitive elements), (*Temperature sensitive elements, Temperature control), Patents, Electric bridges, Feedback, Electric motors, Relays, Recording systems, Electron tubes, Wiring diagrams.

Automatic electrinic multipoint temperature control and regulation instrument with electric three-positional regulator and recording of measurement results on a tape diaphragm, distinguished by the fact, that for the purpose of assuring the fixing of control of any given temperature in each point with high accuracy, the fixing device of the instrument is made in accordance with an automatically equilibrating AC bridge, the arms of which contain variable resistors, each one of which is connected in-parallel to the rheochord with the aid of a points switch of the instrument. (Author)

AD-412 811 Div. 8
(TISTE/JWS) OTS price $1.60

Radio Corp. of America, Somerville, N. J.
RESEARCH AND DEVELOPMENT ON HIGH CURRENT TUNNEL DIODES.
Interim development rept., 4 Jan-30 June 63. 30 June 63, 15p.
Contract NObsr87540
Unclassified report

Descriptors: (*Tunnel diodes, Manufacturing methods), Containers, Germanium, Gallium alloys, Arsenic alloys, Crystal growth, Fixed contacts, Life expectancy, Tin, Impurities.

Twenty 100-ampere peak current tunnel diodes were delivered to the Navy. Of these 12 units were germanium (efficiencies from 44.5 to 53.8 percent) and eight were gallium arsenide (efficiencies

from 52.2 to 63.5 percent). Difficulties were encountered with the crimping of the top lead of the diodes, necessitating the use of smaller than optimum wire leads. A new package design is proposed which would eliminate such fabrication problems and provide better electrical and thermal performance in a smaller volume. Evaluation of the alloyed dot process showed that diodes with efficiencies comparable to those obtained with the solution regrowth technique can be fabricated. Further investigations into the effect of solution regrowth melt composition on tunnel diode efficiency led to diodes having 200-amperes peak current and 59 percent efficiencies. Further investigations are required to establish the reproducibility of these results. It has been found that a sampling process is required for selecting gallium arsenide crystal, if diodes with the highest possible efficiencies are to be obtained. It has also been found that the counterdopant dot composition is very critical in obtaining maximum efficiency. (Author)

AD-412 821 Div. 8, 25, 2
(TISTP/FEM) OTS price $7.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL INVESTIGATION OF SOUND WAVE SCATTERING IN THE ATMOSPHERE,
by M. A. Kallistratova. 25 June 63, 78p.
FTD TT63 441
Unclassified report

Trans. from Trudy instituta fiziki atmosfery, Atmosfernaya turbulentnost', 4, pp. 203-256, 1963.

Descriptors: (*Atmosphere, Experimental data), (*Sound signals, Scattering), (*Propagation, Sound), Atmospheric refraction, Refractive index, Turbulence, Periodic variations, Temperature, Wind, Velocity, Atmospheric motion, Phase distortion, Signal-to-noise ratio, Radio waves, Electromagnetic waves, Theory, Attenuation, Radio interference, Meteorological phenomena, Audiofrequency, Very low frequency.

The propagation of sound waves in the atmosphere is significantly effected by the nonuniformities of refractive index produced by turbulent fluctuations of temperature and windspeeds. Turbulence causes fluctuations of amplitude and phase of sound waves, scattering, and additional attenuation. (Author)

AD-412 827 Div. 8, 26
(TISTP/FEM) OTS price $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
MATERIAL PROCESSING AND PHENOMENA INVESTIGATIONS FOR FUNCTIONAL ELECTRONIC BLOCKS.
Interim engineering rept. no. 3, 6 Mar-6 June 63, by S. J. Angello. 1963, 56p.
Contract AF33 657 9897
Unclassified report

Descriptors: (*Materials, Processing), (*Electrochemistry, Anodes), (*Electron beams, Manufacturing methods), Phosphorous, Silicon, Boron, Oxides, Films, Geometry, Electron microscopy, Scanning, Gates (Circuits), Thickness, Photographs, Printed circuits, Modules (Electronic), Optical equipment, Semiconductor devices.

Full geometry control over anodic oxide growth on n-type silicon web has been achieved within the present accuracy of the optical set-up. The opto-electrochemical system for measurement of surface recombination velocity in silicon as a function of the impurities incorporated into an oxide film, and as a function of applied cell bias (field-effect), has become fully operational. Doped anodic oxide films have been used as localized diffusion sources without masking the rest of the silicon surface with an undoped oxide layer. Many experimental passivated functional electronic blocks (FEB's) fabricated at Westinghouse have been examined in the scanning electron microscope. Also examined were several integrated semiconductor devices purchased on the open market, and several specially fabricated devices. A method has been successfully developed and demonstrated for positioning the gate electrodes on silicon field-effect devices utilizing a feedback signal derived from the workpiece. (Author)

AD-412 841 Div. 8
(TISTE/OHD) OTS price $2.60

Lear Siegler, Inc., Santa Monica, Calif.
SEMICONDUCTOR THIN FILMS.
Quarterly rept. no. 6, 1 Apr-30 June 63. 1963, 18p.
Contract AF33 657 7623
Unclassified report

Descriptors: (*Semiconducting films), Manufacturing methods), Vapor plating, Vacuum, Gallium compounds, Arsenides, Hall effect, Measurement, Electron microscopy, Chemical milling, X-ray diffraction analysis.

(1) To Deposit Films in a Dynamic 10 to the -8th power Vacuum System; (2) To Investigate Annealing of GaAs Films; (3) To Make Hall Measurements at a Series of Temperatures; (4) To Investigate Deposition at Microns per Second; (5) To Improve the Resolution in Electron Microscope Surface Studies and to Investigate a Setup for Etching Thicker Films Down to Thicknesses Suitable for Electron Microscopy; and (6) To Continue Device Studies with Films of Available Quality. (Author)

AD-412 845 Div. 8
(TISTE/PAR) OTS price $3.60

New York U., Coll. of Engineering, N. Y.
SOME NETWORK PROPERTIES OF THE LARGE AREA PN JUNCTION.
Scientific rept. no. 4,
by G. J. Herskowitz. July 63, 32p. Technical rept. no. 400 81
Contract AF19 628 379, Proj. 5628, Task 562801
AFCRL 63 317 Unclassified report

Descriptors: (*Semiconductor devices, Integrated circuits), Mathematical model, Theory, Manufacturing methods, Test equipment (Electronics), Geometrical forms, Integral transforms, Mathematical prediction, Electrical properties, Partial differential equations.

Reverse-biased large area PN junctions are used with integrated semiconductor circuits to perform network functions. This paper describes the network properties of such junctions, utilizing an analytic technique which allows the frequency and transient response to be described directly in terms of material, geometry, bias and termination impedance. Fabrication of the junction and experimental verification of the theory are described. (Author)

AD-412 855 Div. 8
(TISTE/JWS) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
THEORETICAL AND EXPERIMENTAL STUDIES OF ANTENNAS AND ARRAYS IN A PARALLEL-PLATE REGION,
by B. Rama Rao. 15 Mar 63, 14p. Scientific rept. no. 1, S 3
Contract AF19 628 2406, Proj. 5635, Task 563502
AFCRL 63 107 Unclassified report

Descriptors: (*Antenna configurations, Wave transmission), (*Antenna components, Electromagnetic properties), Equations, Resonance, Electric fields, Antenna radiation patterns, Electrical impedance, Measurement, Test methods, Test equipment (Electronics), Coupled antennas.

The directional characteristics and input impedance of a two-element Yagi-type array in a parallel-plate region were studied. The optimum values of the tuning reactance and inter-element spacing at which the parasite gives the best performance either as a reflector or as a director were obtained. The radiation fields in the directions away from and towards the parasite, and the input impedance to the array were measured experimentally and found to be in good agreement with theory. (Author)

AD-412 874 Div. 8, 30, 32
(TISTP/TL) OTS price $6.60

Institute for Defense Analyses, Washington, D. C.
COHERENT LANGUAGE: AN EXPERIMENT IN LINGUISTIC CATEGORIZATION,
by Thomas G. Belden and H. Wallace Sinaiko.
June 63, 1v. Rept. no. R104; HQ63 1699
Contract SD50, Task 29
Unclassified report

Descriptors: (*Language, Armed forces operations), (*Armed forces operations, Communication theory), Learning, Man, Machines, Human engineering, Computers, Functional analysis, Command and control systems, Communication theory.

AD-412 876 Div. 8
(TISTE/OHD) OTS price $1.60

General Electric Co., Holyoke, Mass.
HIGH POWER, HIGH VOLTAGE, AUDIO FREQUENCY TRANSFORMER DESIGN MANUAL.
Quarterly rept. no. 4, 1 Apr-30 June 63.
1 July 63, 13p.
Contract NObsr87721, Proj. SR008 03 02, Task 9599
Unclassified report

Descriptors: (*Transformers, Audiofrequency), (*Power equipment, Transformers), Electric potential, Extremely low frequency, Very low frequency, Electric insulation, Magnetic cores, Temperature, Design.

The purpose of this project is the investigation, presentation, and verification of data and design methods used to design high power, high voltage, audio frequency transformers. Ratings of these transformers fall within the following characteristics: (a) Peak power levels from 15 to 350 kilowatts; (b) Operating frequencies from 20 cps to 20,000 cps; (c) Peak voltage ratings from 4,000 volts to 28,000 volts; and (d) Impedance levels of 300 to 3,000 ohms primary and 10 to 1,200 ohms secondary. The scope of this work includes a thorough discussion of the mechanical and packaging aspects of the design, the insulation materials and processing of those materials, and the electrical and magnetic characteristics of audio frequency transformers. (Author)

AD-412 877 Div. 8
(TISTP/MB) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
STUDY OF ADVANCED TECHNIQUES FOR COOLING VERY HIGH POWER MICROWAVE TUBES (VORTEX FLOW),
by Lester Feinstein and R. E. Lundberg. 15 Apr 63, 14p. Technical note no. 3
Contract AF30 602 2760, Proj. PMU 4092
RADC TDR63 242 Unclassified report

Descriptors: (*Electron tubes, Cooling), Microwaves, Power, Measurement, Pressure, Heat transfer, Heat, Temperature.

Measurements of pressure drop in test sections with twisted tape have been performed. From the accumulated data, friction factors which can be compared with those of straight tubing can be obtained. Burnout measurements have been made and fluxes of 8500 watts per sq cm have been reached with the twisted tapes in the test tubing. Corrections for wall temperature measurements have been prepared and will be used in making heat transfer measurements. (Author)

AD-412 887 Div. 8
(TISTP/FEM) OTS price $2.60

David Sarnoff Research Center, Princeton, N. J.
EVAPORATED THIN-FILM DEVICES.
Scientific Rept. no. 3, 1 Mar-31 May 63,
by H. Borkan, F. V. Shallcross, A. Waxman and P. K. Weimer. 10 June 63, 23p.
Contract AF19 628 1617, Proj. 4608, Task 460804
AFCRL 63 178 Unclassified report

Descriptors: (*Transistors, Materials), (*Semiconducting films, Manufacturing methods), Hall effect, Motion, Cadmium compounds, Sulfides, Gates (Circuits), Films, Electrical impedance, Tellurides, Design, Preparation, Gases, Energy, Photoconductivity, Electrical conductance, Electric currents.

A glow discharge technique has been developed for improving the contact between the overlying source electrode and the cadmium sulfide in the coplanar-electrode thin-film transistor. It was demonstrated that aluminum scattered into the gap region during the source-drain evaporation was oxidized upon exposure of the completed unit to air. The effects of vacuum, air, water vapor, and other ambient gases upon unencapsulated TFT's during and after fabrication were studied. An analysis based upon the polycrystalline barrier model has been made to explain the observed dependence of mobility upon gate bias. Control action has been observed in a coplanar insulated-gate transistor using hole conduction in a cadmium telluride film. Geometric design parameters for TFT's based upon field-effect analysis were derived. (Author)

AD-412 889 Div. 8, 26
(TISTE/CAM) OTS price $2.60

Radio Corp. of America, Harrison, N. J.
PRODUCTION ENGINEERING MEASURE FOR TUBE TYPE 7587.
Quarterly rept. no. 4, 1 Mar-31 May 63,
by W. Ackermann. 1963, 23p
Contract DA36 039sc86732
Unclassified report

Descriptors: (*Electron tubes, Manufacturing methods), Production, Wire winding machines, Industrial equipment, Machines.

A detailed account is presented of the effort expended in implementing the construction and debugging phases of each task. The account indicates the degree of physical completion of each task in terms of photographs, and shows the results of specific debugging tests. This account shows that the construction phase of the truss grid winding machine task is completed, and debugging is under way. Evaluation of the head design for the exhaust machine task is completed, and final heads are in construction. The lead loader task is nearing completion of the construction phase. Also included is an indication of preparations in process for the production of engineering test samples of Tube Type 7587. (Author)

AD-412 892 Div. 8
(TISTP/FEM) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GRAPHO-TAPE METHOD OF CONSTRUCTION OF CONTACT,
by V. N. Roginski. 12 July 63, 22p.
Unclassified report

Trans. from Problemy Peredachi Informatsii, AN SSSR Moscow, 6, pp. 34-45, 1960.

Descriptors: (*Relays, Synthesis), Analysis, Tapes, Circuits, Networks, Numbers, Numerical analysis, Models (Simulations).

The algorithm of the construction of the scheme of contact (1,k) - poles is described with utilization of detours, which is the development of the graphic method. It appears that a model of an algorithm can easily be made. (Author)

AD-412 918 Div. 8
(TISTP/FEM) OTS price $3.60

Mitre Corp., Bedford, Mass.
ON REPEATING A DIGITAL MESSAGE TO INCREASE THE PROBABILITY OF CORRECT RECEPTION,
by H. Dym. July 63, 38p. Rept. no. TM3389
Contract AF33 600 39852, Proj. 603
ESD TDR63 239 Unclassified report

Descriptors: (*Communication systems, Digital systems), (*Data transmission systems, Errors), (*Radio communications systems, Reliability), (*Communication theory, Radio reception), Radio receivers, Radio transmission, Data, Costs, Coding, Probability, Signal-to-noise ratio, Optimization, Numerical analysis.

The theoretical aspects are considered relative to the repetition of messages as a means of error detection and correction, where, on the average, less than 50% of the digits received are in error, and reception reliability is obtained at the expense of a lower data rate. Two repetition schemes, fixed and sequential, are considered, and applicable formulae are derived. Comparison is made of such repetition schemes with more sophisticated techniques, e.g., those involving optimum coding. (Author)

AD-412 920 Div. 8, 30
(TISTE/JBM) OTS price $4.60

Acoustics Research Lab., Harvard U., Cambridge, Mass.
ZYP - AN AUTOMATIC IMPEDANCE AND ADMITTANCE PLOTTER,
by Harry A. Schenck. June 63, 37p. RM56
Contract Nonr1866 24
Unclassified report

Descriptors: (*Measuring devices (Electrical and electronic), Electrical properties), (*Recording systems, Electrical properties), (*Electrical impedance, Measuring devices (Electrical and electronic)), (*Admittance, Measuring devices (Electrical and electronic)), Synchronization (Electronics), Switching circuits, Functions, Demodulators, Oscillators, Electric potential, Meters, Electric filters, Frequency, Electroacoustic transducers, Scalers, Mechanical drawings, Circuits, Complex variables.

ZYP will measure and record as a function of frequency complex impedances in the range 0 - 100 kilohms, complex admittances in the range 0 - 10 millimhos, and complex transfer functions. A two-phase oscillator supplies reference and quadrature switching signals between 30 and 30 000 c/s to a two-channel synchronous detector. Complex ratios are measured by holding the donominator signal constant and by delivering the numerator signal, which is then proportional to the complex ratio, to each channel of the synchronous detector. The two filtered dc output voltages of the detector deflect meters or an x-y recorder in proportion to the real and imaginary parts of the unknown ratio. (Author)

AD-412 939 Div. 8
(TISTP/RD) OTS price $2.60

Electronic Communications, Inc., Timonium, Md.
INVESTIGATION OF IMPROVED AIRBORNE ANTENNA TECHNIQUES FOR COMBAT SURVEILLANCE,
Quarterly progress rept. no. 4, 1 Mar-31 May 63,
by Marvin Cohn and Robert S. Littlepage.
28 June 63, 21p.
Contract DA36 039sc90750, Proj. 1G6 20901A040 01
Unclassified report

Descriptors: (*Combat surveillance, Airplane antennas), (*Airplane antennas, Combat surveillance), Slot antennas, Antenna radiation patterns, Waveguides, Coupled antennas.

A 10 x 2 element surface wave excited slot array has been designed, based on single slot data, to have a constant amplitude illumination. Pattern measurements in both the E and H planes are in very good agreement with the predicted patterns. Mutual coupling was not a problem in this small array. This initial array plate was inverted, resulting in an exponentially illuminated 10 x 2 element array. Here the measured pattern was not in good agreement with the pattern determined by analysis. A possible explanation is given. An

exponential taper to a thin dielectric tape was investigated and resulted in a more efficient transition from a tight to a loosely bound surface wave within the trough waveguide. Using this improved taper, fields of high purity extend to heights of at least eighteen wavelengths. (Author)

AD-412 946 Div. 8, 26
(TISTE/OHD) OTS price $5.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION OF SEMICONDUCTOR DEVICES. 2N560, 2N1051, 2N1072, 2N1195, 1N664, 1N665, 1N666, 1N667, 1N668, 1N669, 1N673, 1N675, 1N697 and 1N701.
Quarterly progress rept. no. 14, 1 Jan-31 Mar 63, by H. J. Huber. 31 Mar 63, 50p.
Contract DA36 039 sc 81294
Unclassified report

Descriptors: (*Manufacturing methods, Semiconductor devices), (*Transistors, Production), (*Diodes (Semiconductors), Production), Machines, Automation.

The purpose of this Production Engineering Measure, as initiated and subsequently modified, is to design and develop production techniques for the 2N560, 2N1051, 2N1195 and 2N1072 transistors and the 0.4 watt diodes with the objective of establishing production capacities (Author)

AD-412 952 Div. 8, 25
(TISTP/WH) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
HARMONIC GENERATION IN PLASMAS.
Final rept.,
by Fedele J. Sforza. Aug 63, 11p.
Proj. 5519, Task 551906
RADC TDR63 288 Unclassified report

Descriptors: (*Harmonic oscillators, Plasma physics), (*Microwaves, Waveguides), (*Waveguides, X band), Propagation, Radio waves, Argon, Gases, Millimeter waves.

The phenomena of harmonic generation in a plasma are investigated experimentally. A discharge was created in a rectangular waveguide and radiated by a high intensity X-band field propagating in the TE10 mode. Measurements on the variation of the generated second harmonic power with the incident X-band power, for argon gas at low pressures, were performed, and the results found to be in very good agreement with theory. Experimental data on the reflected X-band power as a function of the incident power are shown and compared with theoretical predictions. (Author)

AD-412 954 Div. 8
(TISTE/JWS) OTS price $9.60

Airborne Instruments Lab. Inc., Deer Park, N. Y.
INTERFERENCE ANALYSIS OF NEW CIRCUIT COMPONENTS AND TECHNIQUES.
Final rept., Apr 62-Mar 63,
by L. M. Orloff and M. Koen. May 63, 104p.
Contract AF30 602 2690, Proj. 4540, Task 454002
RADC TDR63 252 Unclassified report

Descriptors: (*Semiconductor devices, Radiofrequency interference). (*Radiofrequency interference, Semiconductor devices). Test methods, Measurement, Noise generators, Transistors, Oscillators, Transistor amplifiers, Varactor diodes, Harmonic oscillators, Crystal detectors, Parametric amplifiers, Crystal mixers, Gain, Radiofrequency power.

The interference behavior of any solid-state device can be described by two quantities--the saturation input power (p sub s) and the third-order intermodulation coefficient (K sub 3). Comparisons of the values of these two quantities in transistor amplifiers, parametric amplifiers, tunnel-diode amplifiers, a maser amplifier, and a crystal mixer show that large p sub s and small K sub 3 (both desirable) are generally compatible goals. Some exceptions to this rule are noted for the maser amplifier and devices operating at relatively high frequencies. Measurements of gain, saturation, desensitization, cross modulation, and intermodulation can be accomplished on a device using a single test setup. For a transistor oscillator, it is shown that: (1) a quantity zeta found for an oscillator, is related to the amount of harmonic distortion present, (2) harmonic content and frequency stability can be improved at the expense of tunability, (3) low harmonic content can be obtained without significantly reducing output power. Diode detectors and varactor harmonic generators were also considered. (Author)

AD-412 972 Div. 8
(TISTE/JBM) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
AN EXPERIMENTAL INVESTIGATION ON THE BEHAVIOR OF THE DIPOLE ANTENNA NEAR THE INTERFACE BETWEEN THE CONDUCTING MEDIUM AND FREE SPACE,
by Keigo Iizuka. 15 Apr 63, 20p. Scientific rept. no. 4
Contract AF19 604 7262, Proj. 7661, Task 76615
AFCRL 63 455 Unclassified report

Descriptors: (*Dipole antennas, Experimental data), Antenna configurations, Admittance, Electric currents, Electrical conductance, Electrical insulation, Ionosphere, Plasma medium, Underwater, Performance (Engineering), Solutions.

An experimental study was made of the driving-point admittance and the relative amplitude and phase distributions of the current for a dipole antenna near and parallel to the interface between the conducting medium and free space. (The antenna was always located in the conducting medium, unless otherwise specified.) The depth d of the antenna from the interface was varied. The loss tangent of the conducting medium was varied from 0.036 to 8.8, a range which includes a variety of media such as poor insulators, the ionosphere, plasmas, dry earth, wet earth, lake water, and sea water. The antenna height in radians was also varied. Comparisons were made, wherever possible, between the characteristics of the dipole antenna in the half-space and in a space completely filled with the dissipative medium. The driving-point admittances are in good agreement with the available theories by King-Harrison and Wu which have already been verified experimentally by Iizuka and King. Since all measured results are given in terms of dimensionless parameters, they may be applied to any combination of conductivity, frequency, dielectric constant, and distance of the antenna from the interface. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-412 981 Div. 8, 26
(TISTE/OHD) OTS price $4.60

Texas Instruments, Inc., Dallas.
SILICON SEMICONDUCTOR NETWORKS MANUFACTURING METHODS.
Interim technical engineering rept., Apr-June 62, by W. C. Brower. May 63, 44p.
Contract AF33 600 42210, ASD Proj. 7 865
ASD Interim rept. 7 865, vol. 8
Unclassified report

Descriptors: (*Microminiaturization (Electronics), Manufacturing methods), (*Manufacturing methods, Integrated circuits), Photoengraving, Low temperature research, Temperature, Production, Machines, Chemical milling, Cleaning, Fixed contacts, Silicon, Semiconductor devices.

Process investigations are in their final stages for the operation and prove-in of semiconductor network fabrication equipment. All pilot line equipment is on order, approaching completion of construction, or has been installed and operated on the pilot production line. Emphasis on processing of semiconductor network material in slice form has resulted in an integrated diffusion-darkroom facility with automatic operations carried out on advanced machines in a clean atmosphere. The weldable package design is undergoing final production prove-in before full introduction into the process. (Author)

AD-412 983 Div. 8
(TISTE/PAR) OTS price $5.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
VULCAN. HIGH-TEMPERATURE ANTENNA INVESTIGATION AND DEVELOPMENT.
Interim engineering rept. no. 1, 1 Apr-30 June 63,
by John J. Earshen. 1963, 56p. Rept. no. UB 1807 E1
Contract AF33 657 11100, Proj. 6278, Task 627802
Unclassified report

Descriptors: (*Antennas, High temperature research), Heat, Slot antennas, Spiral antennas, Helical antennas, Dipole antennas, Coaxial cables, Waveguide windows, Heater, Dielectrics, Antenna radiation patterns, Antenna feeds, Waveguide slots, Thermocouple pyrometers, Thermocouples, Heat resistant materials.

Work was continued on the preliminary studies of the various types of antennas to determine which types would have the highest probability of operating successfully in a 2000 F environment. An experimental study was started on the slot, annular slot, and scimitar antennas operated at room temperature. A proposed ground plane assembly, consisting of a small heated central section and a large thermally isolated metal plane, was designed and tested successfully on the CAL antenna range. Preliminary design of the central or thermal section of the ground plane was completed and construction was started. A materials investigation and fabrication techniques study has been initiated in order to determine which dielectric materials are suitable for high temperature use, to determine suitable conducting coatings, and to develop coating and sealing techniques for high temperature operation. (Author)

AD-412 995 Div. 8
(TISTP/AAR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOME OPERATING CONDITIONS OF A SINGLE-STAGE SELF-OSCILLATOR WITH DELAY.
14 June 63, 8p.
Task 15a
AID Rept. T 63 83 Unclassified report

Descriptors: (*Oscillators, Operation), Circuits, Modulation, Frequency, Oscilloscopes.

The operating conditions of the self-modulated oscillations of a single-stage oscillator with delay have been studied. The presence of sinusoidal and rectangular self-modulation, predicted by theory, was confirmed. It was demonstrated that besides asynchronous relationships between self-modulation frequencies and the carrier frequency, synchronous relationships also are possible. The latter instance is illustrated by oscillograms. The operating conditions of double self-modulation caused by the joint action of the delay line and of inertial nonlinearity, as well as those of video pulse generation, were investigated. (Author)

AD-413 048 Div. 8
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON CONDITIONS OF RADIO COMMUNICATION IN HIGH AND MIDDLE LATITUDES,
by Ye. Ye. Goncharova and M. V. Kiseleva.
28 June 63, 17p.
FTD TT63 443 Unclassified report

Trans. from Russian Periodical, Geomagnetizm i Aeronomiya, 3:1, pp. 94-103, 1963.

Descriptors: (*Ionospheric propagation, Radio communication systems), Radio communication systems, Ionospheric disturbances, Radiofrequency, Polar regions.

A study was made of radio communication conditions in high and middle latitudes as a function of the state of the ionosphere. Prolonged communication breakdowns have been observed during strong magneto-ionospheric disturbances. Breakdowns in communication were observed on long radio links even when the ionosphere was in a quiet state. The possibilities for radio communication at high frequencies through reflection of radio waves from the sporadic E sub s layer. (Author)

AD-413 060 Div. 8
(TISTE/OHD) OTS price $15.50

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF CIRCULAR ARRAYS. 4. TABLES OF QUASI-ZEROTH-ORDER $\gamma_{dR}^{m}(h)$, $T^{m}(h)$, $T'^{m}(\lambda/4)$, ADMITTANCES, AND QUASI-FIRST-ORDER SUSCEPTANCES,
by Richard B. Mack. 1 May 63, 1v. Technical rept. no. 384
Contract Nonr186632, Proj. NR371 016
Unclassified report

Descriptors: (*Antennas, Coupled antennas), Special functions (Mathematical), Mathematical analysis, Admittance, Electrical properties, Tables, Sequences.

For from two to five identical antennas of radius a/lamda = 0.007022 and half-length h/lamda = 1/4, 3/8, 1/2, 5/8, located at the corners of an equilateral polygon of side d/lamda the following quantities are tabulated over a d/lamda range of

1/16 to 2.95 : psi superscript m sub dR(h), T superscript m(h) or T' superscript m(h), quasi-zeroth-order sequence admittance, quasi-first-order sequence admittance, quasi-zeroth-order self admittance, quasi-first-order self admittance, and quasi-zeroth- and quasi-first-order mutual admittances. For an isolated antennas of radius a/lamda = 0.007022 corresponding quantities are tabulated for h/lamda = 0.1910 to 0.7460. (Author)

AD-413 071 Div. 8
(TISTE/AAR) OTS price $4.60

Electron Tube Research Lab., U. of Minn. Minneapolis.
NOISE MEASUREMENTS AS A TOOL IN ELECTRON DEVICE RESEARCH.
Quarterly progress rept. no. 1, 1 Jan-31 Mar 63, by A. van der Ziel. 31 Mar 63, 32p. Rept. no. 13
Contract DA36 039AMC00028, Task 3A99 13 003 02
Unclassified report

Descriptors: (*Noise, Measurement), (*Electronic equipment, Scientific research), Thin films, Diodes, Gold, Titanium, Photons, Emissivity.

Equipment for secondary emission noise measurement has been completed and put into operation. Thin film devices of the Ti-Ti2O5-Au type have been developed and useful lessons have been learned about their processing. The Philips K81A noise diode can be used for calibration at low shot noise levels. Its spectrum is white and the noise does not occur in the form of bursts. Secondary emission noise of gold targets has been measured. The correlation between electron emission noise and photon noise in MgO cathodes increases with increasing frequency. Measurement of the ac impedance of MgO cold cathode tubes has been carried out. The Ti-Ti2O5-Au samples manufactured in our laboratory have stable characteristics but only a short lifetime. A theory is given of photon noise in MgO layers and in cathodoluminescence and improved methods for detecting this noise are devised. The methods have applications to other sources of photon noise. A discussion is given of various mechanisms that can explain the apparent shot noise suppression in thin film targets. (Author)

AD-413 076 Div. 8, 25
(TISTP/FEM) OTS price $8.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
(No title).
Consolidated quarterly rept., 1 Jan-31 Mar 63. 31 Mar 63, 93p. Technical rept. no. MDL Q4
Contracts Nonr128805 and AF04 647 745
Unclassified report

Descriptors: (*Electron beams, Microwave equipment), (*Solid state physics, Lasers), (*Plasma physics, Propagation), Backward-wave oscillators, Extremely high frequency, Feasibility studies, Electron guns, Circuits, Dielectrics, Cyclotrons, Brillouin zones, Pumping (Electronics), Gamma rays, Ruby, Rods, Liquid cooled, Nitrogen, Damage, Crystals, Tunnel diodes, Masers, Relaxation time, Helium, Plasma oscillations, Radiofrequency power, Electron density.

Research reported herein is to extend the useful frequency spectrum into the range from microwave frequencies to optical frequencies and to improve existing devices and techniques in the microwave spectrum. At present this objective is being pursued by studies of electron beam devices, solid state devices, and plasmas. (Author)

AD-413 080 Div. 8
(TISTP/FEM) OTS price $2.60

Technical U., Copenhagen, Denmark.
RECEPTION OF SKYWAVE SIGNALS NEAR A COASTLINE, by J. Bach Andersen. Sep 62, 15p. TN3
Contract AF61 052 503
Unclassified report

Descriptors: (*Ionospheric propagation, High frequency), (*Antennas, Site selection), (*Radio reception, Electromagnetic wave reflections), Radio signals, Intensity, Signal-to-noise ratio, Electrical properties, Earth, Water, Reflectors, Antenna radiation patterns, Angle of arrival, Attenuation, Terrain, Electrical conductance, Sea water, Antenna lobes, Geometry, Electromagnetic waves.

An experimental investigation is described on the influence of ground inhomogeneities on the reception of skywave signals, especially the influence of the conductivity contrast near a coastline. This gives rise to a rapid decrease in field-strength near the coastline as is well known from groundwave mixed-path theory. Comparison with theory is given. Influence of diffuse reflection from the ionosphere is also considered. (Author)

AD-413 085 Div. 8
(TISTE/OHD) OTS price $4.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-112-1-50, AND QUALIFICATION SUPPLEMENT I THEREOF, ANTENNA GROUP, HARD RECEIVE, by C. L. Waby. 25 Feb 63, 45p. Document no. D2 14104 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Antenna components, Lightning arresters), Environmental tests, Experimental data.

AD-413 086 Div. 8, 26
(TISTE/CAM) OTS price $11.50

Western Electric Co., Winston-Salem, N. C.
INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM CAPACITORS.
Quarterly progress rept. no. 17, 25 Feb-25 May 63, by J. B. Rawls. 25 May 63, 152p.
Contract DA36 039SC81268
Unclassified report

Descriptors: (*Capacitors, Varnishes), (*Manufacturing methods, Capacitors), Production, Environmental tests, Films, Cellulose acetates, Polymers, Carbonates, Tests, Dielectric films.

Work has continued on the evaluation and modification of existing equipment to manufacture polycarbonate capacitors. Polycarbonate films have been cast on polyester substrate film with

greater success than polyvinyl fluoride substrate film. Effort was directed toward completing the 0.1 mfd cellulose acetate pilot run test report, manufacture and testing the 1.0 mfd cellulose acetate pilot run samples and the production of polycarbonate capacitors. (Author)

AD-413 091 Div. 8
(TISTE/OHD) OTS price $5.60

Cruft Lab., Harvard U., Cambridge, Mass.
THEORETICAL AND EXPERIMENTAL STUDIES OF ANTENNAS AND ARRAYS IN A PARALLEL-PLATE REGION. PART II. THE CURRENT DISTRIBUTION AND IMPEDANCE CHARACTERISTICS OF COUPLED ANTENNAS IN A PARALLEL-PLATE REGION,
by B. Rama Rao. 15 Mar 63, 48p. Scientific rept. no. 16, Series 2
Contract AF19 604 4118, Proj. 5635, Task 563502
AFCRL 63 106 Unclassified report

Descriptors: (*Coupled antennas, Electric fields), Electric currents, Admittance, Theory, Test methods, Integral equations, Fourier analysis, Green's function, Sequences, Electrical impedance.

The current distribution and impedance characteristics of two identical, coupled antennas in a parallel-plate region are studied theoretically and experimentally. The simultaneous integral equations for the current distribution on the coupled antennas have been solved by the method of phase-sequence components. Numerical values for the self and mutual admittances have been calculated for identical antennas of length h = 0.25 lamda and radius a = 0.0105 lamda and for spacings in the range 0.02 equal to or greater than b/lamda equal to or greater than 1.0 where b is the distance between the antennas. The current distribution, self and mutual admittances of the antennas have been measured and are found to be in good agreement with theory. A description of the apparatus and measuring techniques is included. (Author)

AD-413 098 Div. 8, 25
(TISTE/OHD) OTS price $5.60

Crown-Zellerbach Corp., New York.
THEORY OF THE TERMINATED INSULATED ANTENNA IN A CONDUCTING MEDIUM,
by Ronold W. P. King. 3 June 63, 39p. Technical rept. no. 412
Contract Nonr186632, Proj. NR371 016
Unclassified report

Descriptors: (*Antennas, Electric insulation), (*Transmission lines, Impedance matching), Electrical conductance, Field theory, Coaxial cables, Electromagnetic fields, Bessel functions, Mathematical analysis.

The general problem of the insulated antenna in an isotropic homogeneous medium of infinite extent is reviewed under the assumption that the medium is sufficiently conducting to permit the application of coaxial line theory. The current and associated electromagnetic fields for the completely insulated antenna are obtained and the directional properties of the latter explained by comparison with a collinear array. An antenna in which only a central portion is insulated, while the ends are bare, is analyzed in terms of the theories of the insulated and bare antenna. This is done both for the case when the structure is driven by generators at the junctions of the bare and insulated sections and for the case when it is driven by means of an internal coaxial feeder in the manner of a sleeve dipole. Finally, the center-driven insulated antenna with bare ends is investigated and its field is compared with that of the antenna driven at the junctions of the bare and insulated sections. (Author)

AD-413 114 Div. 8, 26
(TISTE/CAM) OTS price $4.50

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
INTERCONNECTION OF FUNCTIONAL ELECTRONIC BLOCKS.
Interim documentary progress rept. no. 4, 1 Apr-30 June 63,
by D. J. Garibotti and K. O. Olson. 30 June 63, 1v.
Contract AF33 657 8790, Proj. 7 931
Unclassified report

Descriptors: (*Microminiaturization (Electronics), Electron beams), (*Solid state physics, Circuits), (*Circuits, Packaged circuits), (*Electron beams, Automation), Machines, Industrial production, Welding, Processing, Electroplating, Vacuum apparatus, Computer logic, Programming (Computers), Ceramic materials, Integrated circuits.

The objectives of this program are: (1) development of a reliable and high yield interconnection process; (2) automation of the process; and (3) development of an interconnection matrix - packaging system for the interconnection of integral devices. Electron beam techniques are in the process of being developed into an automated joining process. The basic unit of the interconnection system is a ceramic multilayer structure with an extremely high-horizontal and vertical interconnection-capability. The top wafer of the structure is equipped with grooves within which FEB's packaged in flat form containers may be attached. Both alumina and beryllia are being used as the substrate materials. Vacuum deposition, electron beam scribing or etching, electroplating and brazing comprise the processes used to fabricate the multilayer structure. (Author)

AD-413 144 Div. 8
(TISTE/CAM) OTS price $1.60

Radio Corp. of America, Lancaster, Pa.
DESIGN, DEVELOP, AND EVALUATE A HIGH-POWER INTEGRAL CIRCUITED TETRODE FOR 215 MEGACYCLE OPERATION.
Quarterly interim technical rept. no. 5, 1 Apr-30 June 63,
by I. E. Martin and A. W. Bachman. 31 July 63, 14p.
Contract NObsr85371, Proj. SS001002, Task 9409
Unclassified report

Descriptors: (*Tetrodes, Packaged circuits), Radiofrequency power, Very high frequency, Electrical properties, Electrical impedance, Environmental tests, Vibration, Shock (Mechanics).

The program encompasses the design, development, and evaluation of a high-power integral circuited tetrode. The primary objective is the achievement of 825 kilowatt minimum peak power output over a 10 percent frequency band and the delivery of one tube of a stabilized design and one tube of the finalized design. A description is presented of the work performed to rebuild and retest the first tube built, and the modification of the tube design to improve its Shock and Vibration capabilities. (Author)

AD-413 146 Div. 8, 25
(TISTM/BRW) OTS price $2.60

Tyco, Inc., Waltham, Mass.
THE SURFACE BARRIER EFFECT IN PHOTOVOLTAIC CONVERSION.
Final summary rept.,
by Georg Rupprecht. May 63, 19p.
Contract AF19 604 8506
AFCRL 63 815 Unclassified report

Descriptors: (*Photoelectric cells (Semiconductor), Photoelectric effect), Metal films, Photoelectric effect), Semiconducting films, Vapor plating, Oxides, Dielectric films, Thickness, Silicon, Gold, Aluminum.

An investigation of the photovoltaic effect in cells constructed by the evaporation of a metal film on a semiconductor surface is described. For high efficiency, the thickness of the oxide layer between the semiconductor and the metal film must be below a critical thickness. The photovoltaic effect is determined by surface states, rather than by the difference of the work functions of the semiconductor and metal. (Author)

AD-413 301 Div. 8
(TISTP/FEM) OTS price $2.30

Technical U., Copenhagen (Denmark).
AN EXTENSION TO THE THEORY OF A DIPOLE OVER AN INHOMOGENEOUS GROUND,
by J. Bach Andersen. Nov 62, 18p. Technical note no. 4
Contract AF61 052 503
ARCRL 63 33 Unclassified report

Descriptors: (*Electromagnetism, Theory), (*Dipole antennas, Antenna radiation patterns), Propagation, Earth, Reflection, Dielectric properties, Electric currents, Attenuation, Antenna lobes, Electric fields, Angle of arrival.

The compensation theorem is applied to the problem of the skywave field from a vertical, electrical dipole placed on an inhomogeneous, plane ground consisting of two or three media of arbitrary electrical properties. The effect of propagation at oblique angles across a boundary is considered and it is shown that the theory is in agreement with ordinary Fresnel zone theory when the ground around the dipole is perfectly conducting. Special cases of the three-media problem are treated numerically. (Author)

AD-413 302 Div. 8, 25
(TISTE/CAM) OTS price $12.50

General Electric Co., Schenectady, N. Y.
ADVANCED ELECTRON BEAM RECORDING TECHNIQUES.
Final rept.,
by Sterling P. Newberry, Erwin C. Buschmann, and Theodore H. Klotz. 7 May 63, 1v.
Contract AF30 602 2659, Proj. 4505, Task 450503
RADC TDR63 234
Unclassified report

Descriptors: (*Electron beams, Recording systems), (*Recording systems, Electron beams), (*Electron guns, Electron beams), Thermionic emission, Electric fields, Electron guns, Focusing, Electron microscopes, Thermoplastics, Tapes, Field emission, Cathodes (Electron tubes), Life expectancy, Electric potential, Preparation, Electric discharges, Theory, Triodes, Electron optics, Particle trajectories, Electrodes, Surfaces, Electron lenses

An initial program to extend the state-of-the-art in wideband electron beam recording by Schottky emission is reported. Goals for the program were production and test of a breadboard model electron gun. The role of electrode spacing in ion damage of the cathode was discovered. Smooth surface projections were shown to hold the key to the discrepancy between theory and practice in voltage breakdown and quantitative values were found by a digital computer which gave the field strength near a surface projection as a function of shape. An outgrowth of this surface projection study was discovery of a new, more promising approach to a pure field emission source. Whereas, the Schottky effect can increase thermionic emission 10 - 20 fold, field emission can in principle gain another two orders of magnitude. (Author)

AD-413 315 Div. 8
(TISTP/FEM) OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
THERMAL CUTOFFS OF THE WHISTLER MODE OF PROPAGATION,
by Harold B. Liemohn. Mar 63, 1v. Document no. D1 82 0229
Unclassified report

Also available from the author.

Descriptors: (*Whistlers, Propagation), (*Electromagnetic waves, Exosphere), (*Reentry vehicles, Radio communication systems), Probes (Electromagnetic), Very low frequency, Ultrahigh frequency, Plasma medium, Thermonuclear reactions, Satellites (Artificial), Thermal diffusion, Motion, Magneto-optic effect, Plasma physics, Frequency, Attenuation, Doppler effect, Signal-to-noise ratio, Cyclotron resonance phenomen, Damping, Radio transmission, Plasma sheath, Penetration, Refractive index, Tables, Numerical analysis, Electron density, Atmospheric temperature, Microwaves.

Recent theoretical analysis of the thermal damping of right-hand circularly-polarized electromagnetic waves propagating along a static magnetic field (whistler mode) in hot plasmas which have (Cauchy) velocity distributions of the form (v square + a square)-3 was extended in order to compare the results more directly with experiments. The dispersion equation has a simple algebraic form which can be solved for all frequencies including cyclotron resonance. A thermal Doppler shift in the cyclotron resonance attenuates the mode below the zero-temperature resonance and produces an effective cutoff experimentally. For a given thermal damping decrement in a magnetic field, curves have been obtained which relate the cutoff frequency to the electron density and temperature of the plasma. The results are compared with previous numerical analyses using the Maxwell distribution.

AD-413 317 Div. 8
(TISTM/RGR) OTS price $15.50

Melpar, Inc., Falls Church, Va.
MODEL TECHNIQUES FOR INTERFERENCE MEASUREMENTS.
Final rept.,
by W. A. Meyer, M. L. Parker, D. W. S. Prins, H. C. Oliver and B. P. Czarnaski. June 63, 220p.
Contract AF30 602 2735, Proj. 4540, Task 454002
RADC TDR63 281
Unclassified report

Descriptors: (*Antennas, Test methods), (*Model tests, Antennas), (*Interference, Antennas), Measurement, Feasibility studies, Engineering, Transmission lines, Design.

The basic objectives of this study are: Establishment of practical limits of the capabilities of modeling antennas utilizing r-f, hydroacoustic, and optics techniques; Development of methods to model complex antennas such as arrays and multiple-fed reflectors; Further investigation of hydroacoustic modeling techniques to include arrays of transducers, pattern control-utilizing lenses, and masks on transducers, broadbanding of techniques to allow for analyzation of antenna behavior over a 10:1 frequency range, and synthesis techniques for modeling of antenna behavior produced by site effects; and Development of model techniques to enable the prediction of antenna behavior in the case of limited measured data on primary antennas. (Author)

AD-413 320 Div. 8
(TISTE/JAB) OTS price $14.00

Kearfott Div., General Precision, Inc., Little Falls, N. J.
SYNCHRO PARAMETER STANDARDIZATION STUDY.
Final engineering rept.
June 63, 195p.
Contract NOw61 0763f
Unclassified report

Descriptors: (*Synchros, Electrical properties), Torque, Control systems, Circuits, Compatibility, Errors, Synchronization (Electronics), Input-output devices, Mathematical analysis.

AD-413 324 Div. 8, 25
(TISTP/FEM) OTS price $3.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
INTERACTION OF A RADIATING SOURCE WITH A PLASMA EFFECT OF AN ELECTROACOUSTIC WAVE,
by Kun-Mu Chen. July 63, 35p. Rept. no. 4563 39T
Contract AF33 616 8365
Unclassified report

Descriptors: (*Electromagnetic waves, Plasma medium), (*Plasma physics, Electromagnetism), (*Electroacoustic transducers, Plasma oscillators), (*Dipole antennas, Electrical impedance), Antennas, Ionization, Gases, Electron density, Ionosphere, Equations, Attenuation, Communication systems, Magneto-optic effect.

When a radiating source is immersed in a homogeneous plasma of infinite extent, an electroacoustic wave may be excited in addition to the usual electromagnetic wave. The electroacoustic wave becomes a longitudinal plasma wave in the far zone of the source. The case of a Hertzian dipole in a lossless plasma is considered first. The fields of both the EM and plasma modes excited by the dipole are explicitly obtained, and the EM and plasma components of the radiation resistance of a Hertzian dipole are determined. The case of a cylindrical dipole antenna in a lossless plasma is investigated next. The far zone fields of both the EM and plasma modes are explicitly obtained, and the EM and plasma components of the radiation resistance are then derived as functions of the antenna dimension and the plasma parameters. Finally, the case of a Hertzian dipole in a slightly lossy plasma is studied; the effect of collisions in a plasma on the radiation resistance of the immersed antenna is discussed. (Author)

AD-413 329 Div. 8
(TISTP/FEM) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ASYMPTOTIC ESTIMATES OF THE ERROR PROBABILITY FOR THE TRANSMISSION OF MESSAGES THROUGH A DISCRETE MEMORYLESS COMMUNICATION CHANNEL WITH A SYMMETRIC MATRIX OF TRANSACTION PROBABILITIES,
by R. L. Dobrushin. 3 July 63, 50p.
FTD TT63 543 Unclassified report

Trans. from Teoriya Veroyatnostey i yeye primeneniya, 7:3, pp. 283-311, 1962.

Descriptors: (*Communication equipment, Transmissions), (*Communication theory, Coding), (*Probability, Matrix algebra), (*Communication systems, Errors), Optimization, Stochastic processes, Statistical processes, Intelligibility, Equations, Integrals, Polynomials, Signal-to-noise ratio.

AD-413 383 Div. 8
(TISTE/JBM) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
REDUNDANT EQUIVALENT LINEAR PASSIVE NETWORKS AND STABILITY.
by Bobby L. Buchanan. May 63, 23p.
Proj. 4608
AFCRL 63 140 Unclassified report

Descriptors: (*Electrical networks, Redundant components), (*Redundant components, Electrical networks), Theory, Linear systems, Coils, Resistors, Capacitors, Stability, Tolerances (Mechanics), Electrical impedance, Distribution theory, Mathematical analysis, Statistical functions, Failure (Mechanics).

The concept of redundant equivalent linear passive networks is introduced. Redundant equivalence conditions are derived and general classes of redundant equivalent networks found for one-port networks. Methods of analyzing the impedance stability of the redundant equivalent networks are presented. Three types of impedance instability are considered: (1) initial value (which is usually associated with the component tolerances), (2) small variations during circuit operation (causes 'drift' failures), and (3) very large variations during circuit operation (causes 'catastrophic' failures). It is shown for what appears to be a reasonable set of assumptions that all three types of instability can be removed by using redundant equivalent networks. (Author)

AD-413 390 Div. 8, 6, 22
(TISTP/JEA) OTS price $8.10

Scintilla Div., Bendix Corp., Sidney, N. Y.
SQUIB DEVELOPMENT PROGRAM.
Final rept. 1 July 62-30 June 63,
by Rolland M. Purdy, Sr. 8 July 63, 1v.
Contract N178 8081
Unclassified report

Descriptors: (*Explosive initiators, Design), Spark ignition, Environmental tests, Radiofrequency power, Semiconductors, Pyrotechnics, Glass seals, Radiofrequency, Hazards, Reliability, Power supplies, Mechanical properties, Electric discharges.

A description of the development of a radio frequency insensitive squib is given. Various problems and their investigation are discussed. Qualification and Radio Frequency Test Programs are presented in detail along with the conclusion that the device evolved can withstand not only severe environmental conditions but also exposure to considerable amounts of RF power without deleterious effects. (Author)

AD-413 402 Div. 8, 25, 15
(TISTP/FEM) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
MULTI-PARAMETER SELF-OPTIMIZING SYSTEMS USING CORRELATION TECHNIQUES,
by Kumpati S. Narendra and Lyle E. McBride, Jr.
5 June 63, 20p. Technical rept. no. 413
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Correlation techniques, Adaptive control systems), (*Optimization, Control systems), (*Adaptive control, Linear systems), Differential equations, Errors, Functions, Integral transforms, Statistical processes, Synthesis, Computers, Feedback.

A class of self-optimizing systems is described which continually alters its parameters to reduce a mean-square performance criterion. The change in each parameter is determined from an error gradient in parameter space computed by cross-correlation methods which are independent of signal spectra and require no test signal or parameter perturbation. Application of this technique to both open-loop and closed-loop systems are included, and it is shown that a combination of such self-optimizing systems is a possible solution to the adaptive control problem. (Author)

AD-413 410 Div. 8
(TISTE/JWS) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
LINE SOURCE ANTENNA ARRAYS FOR CONTROL OF PATTERN, DISPERSION, AND PHASE.
Research rept.,
by C. J. Sletten, P. Blacksmith, Jr., F. S. Holt and J. E. Holland. June 63, 33p.
Proj. 4600
AFCRL 63 182 Unclassified report

Descriptors: (*Coupled antennas, Beams (Electromagnetic)), (*Antenna configurations, Antenna radiation patterns), Dipole antennas, Lens antennas, Horn antennas, Antenna feeds, Waveguides, Antenna lobes, Equations, Algebra, Tables, Mathematical models.

A method of beam synthesis using a superposition of elemental plane waves is applied to problems of microwave antenna patterns of general shape. The method is extended to the limit of an infinite number of plane waves and related to usual Fourier transform methods. A linear array and a lens horn for generating a rectangular shaped beam is designed and experimental results are given. Several new types of microwave prisms are designed for practical waveguide feeding and their performance analyzed. These prismatic antennas allow control of array dispersion, that is, beam swing with frequency change. Techniques for both maximizing and minimizing dispersions are presented. An analytic procedure for describing a curved reflecting surface to produce an arbitrary phase distribution along a line aperture is presented. Application of this technique to line source and subreflector correction of spherical aberrations is presented as a practical example. (Author)

AD-413 418 Div. 8
(TISTP/FEM) OTS price $10.10

Aerospace Corp., Los Angeles, Calif.
ELECTROMAGNETIC WAVE PROPAGATION THROUGH MAGNETO-ACTIVE PLASMAS,
by R. Mason and R. R. Gold. 1 Feb 62, 122p.
Rept. no. TDR69 2119TR3
Contract AF04 695 69
DCAS TDR62 139 Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Propagation, Magnetic fields), (*Plasma medium, Electron density), Theory, Ionization, Gases, Plasma physics, Magneto optic effect, Electric fields, Absorption, Resonance, Geometry, Refraction, Boundary value problems, Atmosphere entry, Plasma sheath, Mathematical analysis.

The general problem of the propagation of a plane harmonic electromagnetic wave through an ionized gas is considered, including collisions, some form of electron density distribution, and a magnetostatically induced anisotropy. The present state of the art is examined first, including an outline of the WKB approximation and a summary of electron density distributions for which complete wave theory solutions exist. Then, specific analytical solutions and appropriate numerical calculations are derived to evaluate the effect of the applied magnetic field on propagation. A detailed parametric investigation, several exemplary flight conditions, and a possible experimental shock-tube program are analyzed assuming a homogeneous plasma. Preliminary estimates of the effects of plasma inhomogeneities and nonuniformities in the magnetic field on propagation are obtained. (Author)

AD-413 449 Div. 8, 20
(TISTE/JWS) OTS price $2.60

Hughes Research Labs., Malibu, Calif.
RESEARCH INVESTIGATION OF p-i-n ELECTRON JUNCTION DETECTORS.
Interim engineering rept. no. 2, 11 May-11 Aug 63.
Aug 63, 17p.
Contract NObsr89169
Unclassified report

Descriptors: (*Diodes (Semiconductor), Radiation measurement systems components), (*Radiation measurement systems components, Diodes (Semiconductor)), Silicon, Dose rate, Electric potential, Tables, Electrometers, Thallium, Radioactive isotopes, Test equipment (Electronics), Polyester plastics, Films, Lithium alloys, Beta particles.

Efforts were directed toward comparing the response of silicon, lithium-drifted p-i-n junction detectors to beta-ray sources with extrapolation chamber measurements of the surface absorbed dose rate, thick sources containing T1204 were utilized in carefully specified geometries. Dose rate measurements were made

using sources with areas of 10.0 cm squared and 1.04 cm squared. Detector open-circuit voltage measurements were made for the 1.04-cm squared-area source, using a number of thin-window p-i-n junction detectors. Comparison to extrapolation chamber measurements shows a linear correlation between open-circuit voltage and surface absorbed dose rate up to rates as high as 400 rad/hr for the geometries studied. (Author)

AD-413 453 Div. 8
(TISTE/JWS) OTS price $4.60

Cruft Lab., Harvard U., Cambridge, Mass.
THEORETICAL AND EXPERIMENTAL STUDIES OF ANTENNAS AND ARRAYS IN A PARALLEL-PLATE REGION. PART IV - WAVE PROPAGATION ALONG INFINITE YAGI-TYPE ARRAY IN A PARALLEL-PLATE REGION,
by B. Rama Rao. 15 Mar 63, 37p. Scientific rept. no. 2, Ser. 3
Contract AF19 628 2406, Proj. 5635, Task 563502
AFCRL 63 108 Unclassified report

Descriptors: (*Antenna configurations, Transmission), (*Propagation, Coupled antennas), Equations, Gain, Integral equations, Integrals, Admittance, Electromagnetic fields, Test equipment (Electronics), Tests, Antenna radiation patterns, Standing wave ratios, Measurement.

An approximate expression for the phase velocity of wave propagation along an infinite Yagi-type array in a parallel-plate region was derived by a variational method. The dependence of the propagation constant on the various geometrical parameters of the array is discussed: For antenna lengths less than a half-wavelength and for short distances between elements, it was shown that there can be two independent surface-wave modes propagating along the structure. A transcendental equation for the propagation constant of the periodic structure was also obtained by a more rigorous impedance approach taking into account the mutual coupling between antenna elements. The design and fabrication of the experimental equipment is described. An outline of the proposed experimental work is given and methods for measuring the propagation constant, gain, front-to-back ratio, current-distribution on the elements, radiation pattern, input impedance, longitudinal and transverse field distribution and excitation efficiency of the array are described. (Author)

AD-413 454 Div. 8, 22
(TISTE/CAM) OTS price $3.60

Metavac Inc., Flushing, N. Y.
FERRITE-CERAMIC RADIO FREQUENCY ATTENUATOR.
Final rept.
28 June 63, 28p.
Contract N178 8108
Unclassified report

Descriptors: (*Radiofrequency, Attenuators), (*Attenuators, Radiofrequency), Manufacturing methods, Processing, Coatings, Manganese compounds, Zinc compounds, Ferrites, Titanium compounds, Ceramic materials, Silicon compounds, Monoxides, Explosives initiators, Electrical properties.

Five alternate versions of suitable ferrite-ceramic RF attenuators were developed in fulfillment of the contract. Each alternate, a ferrite core coated with various materials, attenuates RF energy and will protect electro-explosive devices from spurious initiation. The ferrite material developed is optimum. The ferrite's properties achieved border the state of the art and are considered unimprovable at present. A ferrite with a permeability of 5,500 ± 550 and a resistivity of 3 ± 1 ohm-cm was achieved and reproduced. The five types of coatings prepared for the attenuator have various capacitances. Each of three coating types include silicon monoxide layers ... silicon monoxide has a dielectric constant of approximately 6. Barium titanate (dielectric constant greater than 300) and titanium dioxide (dielectric constant = 100) offer higher capacitance. (Author)

AD-413 477 Div. 8, 25
(TISTP/WH) OTS price $9.10

Electron Tube Research Lab., U. of Minn., Minneapolis.
STUDIES OF PRIMARY ELECTRON SOURCES.
Scientific rept. no. 7, 1 Sep-1 Dec 62,
by D. E. Anderson. Apr 63, 1v.
Contract AF19 604 8381, Proj. 4619, Task 46190
AFCRL 63 129 Unclassified report

Descriptors: (*Cathodes (Electron tubes), Emissivity), (*Alkaline earth metals, Electrodes), Cold cathode tubes, Field emission, Oxide cathodes, Superconductors, Thermionic emission, Barium, Vapors, Barium compounds, Oxides, Sulfides, Triodes, Irreversible processes, Thermodynamics.

Operation of a BaO cathode in the Ba vapor is analyzed using irreversible thermodynamic arguments; preliminary data are examined in terms of the derived quantities. An energy level diagram for a BaO coating, including coating potential drop, is developed from photoelectric energy distributions. Results of preliminary attempts to produce BaS cathodes are presented. Studies of thin film Al-Al2O3-M tunnel devices are described. These include dependence of J-V characteristics on temperature, past history, and high current density; current transfer through an Al central layer; and emission into vacuum through an Au overlayer under pulsed and dc conditions. The possibility of enhanced emission from Ba-covered superconducting field emitters and from thin film superconductors is discussed. (Author)

AD-413 486 Div. 8
(TISTE/JWS) OTS price $1.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURES. HIGH FREQUENCY TRANSISTOR.
Quarterly progress rept. no. 7, 20 Mar-20 June 63,
by T. G. Stoudt. 20 June 63, 12p.
Contract DA36 039sc85969
Unclassified report

Descriptors: (*Transistors, Ultra high frequency), Manufacturing methods, Germanium, Epitaxial growth, Diffusion, Vacuum apparatus, Vapor plating, Bonding, Gain.

Engineering effort was devoted to the following areas: (1) Developing improvements in epitaxial substrate material; (2) Developing improvements in diffusion of epitaxial material; (3) Continued evaluation of practical techniques and

tooling for evaporation and wire bonding processes; (4) discussions on a proposed Test Specification with representatives of U. S. Army Electronics Research & Development Laboratory, U. S. Army Electronics Materiel Support Agency, and U. S. Army Electronics Materiel Agency; (5) Requested preliminary approval for preproduction test equipment. (Author)

AD-413 511 Div. 8, 25
(TISTP/FEM) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
MULTI-PARAMETER SELF-OPTIMIZING SYSTEMS USING CORRELATION TECHNIQUES,
by Kumpait S. Narendra and Lyle E. McBride, Jr.
5 June 63, 20p, Technical Report no. 413
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Adaptive control systems, Optimization), (*Correlation techniques, Signals), (*Optimization, Linear systems), Differential equations, Networks, Frequency, Bandwidth, Integral transforms, Statistical processes, Filters (Electromagnetic wave).

A class of self-optimizing systems is described which continually alters its parameters to reduce a mean-square performance criterion. The change in each parameter is determined from an error gradient in parameter space computed by cross-correlation methods which are independent of signal spectra and require no test signal or parameter perturbation. Application of this technique to both open-loop and closed-loop systems are included, and it is shown that a combination of such self-optimizing systems is a possible solution to the adaptive control problem. (Author)

AD-413 554 Div. 8
(TISTE/CAM) OTS price $3.60

Westinghouse Electric Corp., Baltimore, Md.
RESEARCH ON MILLIMETER FERROMAGNETIC TYPE PARAMETRIC AMPLIFIER.
Quarterly progress rept. no. 5, 1 Feb-30 Apr 63,
by Robert A. Moore and John D. Cowlishaw.
July 63, 1v. 9
Contract DA36 039SC89071
Unclassified report

Descriptors: (*Parametric amplifiers, Millimeter waves), (*Ferromagnetic materials, Paramagnetic amplifiers), Configuration, Pnopagation, Digital computers, Paramagnetic resonance, Magnetrons, Pumping (Electronics), Waveguide couplers, Waveguide irises, Partial differential equations, Dielectrics.

Work has continued on the parallel-pumped magnetodynamic amplifier utilizing the dielectric rod uniform precessional mode resonance. In an initial analysis, the pump power has been computed and is presented in curve form in terms of the dielectric resonator Q and ferrimagnetic line width. The computer solution is given for the propagation characteristics of a dielectric rod. The curves for the dielectric constant of most immediate interest (epsilon = 13.5) are corroborated by experimental spectroscopy of Stycast. Dielectric continuity with YIG makes this material appealing for the design of resonant structures capable of supporting simultaneous electromagnetic and magnetostatic resonances. Results of loss tangent measurements of Stycast and other materials are given for 70 kmc and scale frequencies. Ways of coupling energy into the dielectric and magnetostatic modes were studied; experiments are discussed which resulted in the decision to couple to the pump mode from an iris in the side of the waveguide into the end of the rod and to couple to the YIG sphere directly from the side. (Author)

AD-413 561 Div. 8
(TISTE/JWS) OTS price $6.60

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF CIRCULAR ARRAYS. TABLES OF E(h,z), C(h,z), S(h,z) FOR CIRCULAR ARRAYS OF UP TO 5 ELEMENTS,
by Richard B. Mack and Evelyn W. Mack. 1 May 63, 1v. Technical rept. no. 385
Contract Nonr 1866 32, Proj. NR371 016
Unclassified report

Descriptors: (*Coupled antennas, Electromagnetic properties), (*Antenna configurations, Mathematical prediction), Integral equations, Tables, Antenna radiation patterns, Admittance, Computers.

Tables of the integrals E(h,z), C(h,z), and S(h,z), are given and are applicable to circular arrays of up to 5 antennas equally spaced about a circle. Values good to 5 decimal places are given for the antenna half-length, h/lambda = 1/4, 3/8, 1/2, 5/8, and z/lambda = h/lambda, h/lambda - 1/4, and 0, where z/lambda is the distance along the antenna in wavelengths. The integrals for an isolated antenna of radius a/lambda = 0.007022 are given for 0.1910 equal to or less than h/lambda equal to or less than 0.7460. (Author)

AD-413 562 Div. 8, 26
(TISTE/PAR) OTS price $6.60

Westinghouse Electric Corp., Pittsburgh, Pa.
MATERIAL PROCESSING AND PHENOMENA INVESTIGATIONS FOR FUNCTIONAL ELECTRONIC BLOCKS.
Interim engineering rept., 6 Mar-6 June 63,
by S. J. Angello. 19 June 63, 56p.
Contract AF33 657 9897
Unclassified report

Descriptors: (*Semiconductor devices, Manufacturing methods), (*Manufacturing methods, Semiconductor devices), Oxides, Coatings, Diffusion, Silicon, Phosphorous, Boron, Electron microscopy, Scanning, Electron beams, Photoengraving, Photoelectric effect, Transistors, Positioning devices, Electrochemistry, Diodes, (Semiconductors), Photochemistry.

Contents: Electrochemical Techniques; Geometry control of anodic oxide growth on n-type silicon, Doped anodic oxide films as localized diffusion sources, Out-diffusion studies, Phosphorous diffusion profile in silicon, Production of high resistance n-type layers, Standardization of pyrophosphoric acid, Incorporation of boron into anodic oxide films, Cathodization of previously anodized silicon wafers, Electron Beam Techniques; Scanning electron microscopy, Electron beam fabricating techniques, Electron beam exposure of photoresist, Automatic gate alignment on field-effect devices.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-413 582 Div. 8, 25
(TISTM/BRW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR PULSE TESTS OF MICROTHIN ALLOY CORES, (Pribor Dlya Impul'snykh Ispytaniy Mikronnykh Serdechnikov),
by V. G. Mikhalev and L. L. Mekhel'. 20 May 63, 28p.
FTD TT62 1865 Unclassified report

Trans. from Elektronnyye Vychislitel'nyye Mashiny, Moskva, pp. 1-30, 1961.

Descriptors: (*Magnetic cores, Magnetic alloys), (*Magnetic tape, Magnetic alloys), Magnetic properties, Pulse generators, Hysteresis, Computer logic, Switching circuits, Trigger circuits, Machine translation, Calibration, Test equipment (Electronic).

The mean pulse parameters are tabulated of microthin cores of the alloys 79 NP (cores from tapes of the same thickness made from the alloy 79 NMA have analogous characteristics), 34 KMP and 50 NP: continual magnetic reversal, intensity of the threshold field time of magnetic reversal for various values of the magnetic reversing field relation of the useful signal toward the interfering signal for two values of the leading edge of the magnetic reversal pulses. (Author)

AD-413 595 Div. 8
(TISTE/JWS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MAGNETIC RECORDING METHOD,
by B. S. Broydo. 18 June 63, 4p.
FTD TT63 504 Unclassified report

Trans. from Russian Patent No. 145073, (Appl. No. 726701/26, pp. 1-3, 17 Apr 1961.

Descriptors: (*Magnetic recording systems, Coding), (*Coding, Magnetic recording systems), Patents, Timing circuits, Synchronization, Computer logic, Digital recording systems, Magnetic tape, Scalers.

The method of magnetic recording - reproduction of numbers codes, distinguished by the fact, that for the purpose of reducing the number of used tracks for recording and magnetic heads, the recording of codes of n discharge numbers is realized on two tracks, whereby on the first track is recorded the number code and two marking pulses at the beginning and end o the sending with subsequent pause in n + 2 cadences, and on the second track - cadence pulses synchronized with code pulses. (Author)

AD-413 598 Div. 8, 30
(TISTP/FEM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FUNCTIONAL TRANSFORMER ON NONLINEAR ELEMENTS,
by A. M. Kapelevich. 15 June 63, 4p.
FTD TT63 503 Unclassified report

Trans. from Russian Patent No. 145021, (Appl. No. 696609/26), pp. 1-3, 9 Feb 1961.

Descriptors: (*Nonlinear systems, Transformers), Resistors, Circuits, Electric potential, Electric currents, Differential equations, Mechanical drawings, Computers.

AD-413 654 Div. 8, 26
(TISTE/JAB) OTS price $2.60

Midland Mfg. Co., Inc., Kansas City, Kans.
MODERATE PRECISION GLASS ENCLOSED CRYSTAL UNITS.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 63, by Melvin O. Hammer. Aug 63, 24p. Rept. no. CR XM44 U
Contract DA36 039sc86717
Unclassified report

Descriptors: (*Resonators, Manufacturing methods), (*Glass seals, Manufacturing methods), (*Quartz resonators, Manufacturing methods), (*Crystal holders, Production).

This program is aimed at establishing a production source capable of mass producing a semi-precision quartz crcrystal unit in an evacuated glass holder. When attempting to manufacture a semi-precision crystal unit, several items must be considered and reappraised in the light of generally tighter performance tolerances. This reappraisal generally leads to tightening of manufacturing controls and tolerances. Conventional methods of quartz orientation, sawing, dicing, dimensioning and lapping will be used to obtain a suitable quartz plate. (Author)

AD-413 704 Div. 8
(TISTE/CAM) OTS price $1.10

General Electronic Labs. Inc., Cambridge, Mass.
(No title).
Quarterly progress rept., 1 Apr-30 June 63, by Edward L. Maddox. 2 Aug 63, 4p.
Contract NObsr 85469, Task 9002
Unclassified report

Descriptors: (*Radio receivers, Design), Calibration, Radiofrequency oscillators, Intermediate frequency amplifiers, Audio amplifiers, Video amplifiers, Automatic gain control, Power supplies.

AD-413 806 Div. 8, 6
(TISTE/JWS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IMPROVING THE INTERFERENCE PROTECTION OF RADIO RECEPTION OF AM-SIGNALS BY EMPLOYING NONLINEAR FEEDBACKS IN THE HIGH FREQUENCY PART OF RECEIVING INSTALLATION,
by A. A. Gorbachev. 9 May 63, 10p.
FTD TT63 447 Unclassified report

Trans. from Radiotekhnika, 18:2, pp. 37-42, 1963.

Descriptors: (*Radiofrequency interference, Radio reception), (*Radio receivers, Radiofrequency interference), Feedback, Amplitude modulation, Radiofrequency pulses, Limiters, Crystal rectifiers, Tuned amplifiers, Radiofrequency amplifiers.

AD-413 824 Div. 8, 26
(TISTE/JBM) OTS price $5.60

Western Electric Co., Laureldale, Pa.
MECHANIZATION OF SEMICONDUCTOR DEVICES. 2N559 - 2N1094.
Quarterly progress rept. no. 21, 1 Jan-31 Mar 63, by D. H. Lockart. 31 Mar 63, 52p.
Contract DA36 039sc72729
Unclassified report

Descriptors: (*Transistors, Production), (*Production, Transistors), Manufacturing methods, Machines, Automation, Welding, Bonding.

A production engineering measure was originally initiated to develop two diffused base semiconductor devices, Device 7 (2N694) and Device 12 (2N537). A mechanization program for Device 12 was subsequently added to provide manufacturing capability in anticipation of a Nike Zeus production requirement. After Nike Zeus development had been further advanced, mechanization of Device 12 was limited to four operations and a mechanization program for 2N559 and 2N1094 transistors was begun. (Author)

AD-413 856 Div. 8
(TISTE/JBM) OTS price $2.60

General Electric Co., Owensboro, Ky.
RESEARCH, DEVELOPMENT, AND FABRICATION OF TUNNEL EMISSION CATHODES,
Quarterly rept. no. 4, Apr-June 63
by J. W. Hall, II. June 63, 22p.
Contract DA49 186 ORD1053
Unclassified report

Descriptors: (*Cathodes (Electron tubes), Films), (*Films, Cathodes (Electron tubes)), Dielectric films, Field emission, Electric currents, Density, Sandwich construction, Metal films, Oxides, Gold, Aluminum, Aluminum compounds, Radiofrequency pulses, Manufacturing methods, Processing, Mass spectroscopy, Impurities, Electron microscopy, Vapor plating, Tests, Space charges, Quantum mechanics.

Research was continued on the development of tunnel emission cathodes. Emission currents up to 300 microamperes were measured from Al-Al2o3-Au sandwiches with an area of 1mm sq. In terms of current density, this corresponds to 30 ma sq. cm. The transmission coefficients at these current levels were of the order of 10 to the -3rd power and the peak film currents were usually in the 100-150 ma range. Several sandwiches were operated under pulsed conditions up to 30 hours without burnout at peak film currents of 10-20 ma and with peak emission currents of 10-20 microamperes. Several different metals have been evaporated for accelerator layers on the Al-Al2o3 system but none appeared to give the high reproducibility attained with gold. Experiments were conducted to form an aluminum oxide layer by gaseous anodization. Emission currents up to 5 microamperes have been obtained from Al-Al2o3-Au sandwiches in which the oxide was formed by using this technique but burnout occured at about 30 ma of film current. Mass spectrometric analysis indicated that a high concentration of impurities was present in the oxygen supply which probably contaminated the oxide layer. (Author)

AD-413 880 Div. 8
(TISTE/WA) OTS price $3.60

MITRE Corp., Bedford, Mass.
RADAR SYSTEMS AND TECHNIQUES DEPARTMENT.
Advanced development subdepartment quarterly progress rept., 1 Oct-31 Dec 62.
May 63, 28p. Rept. no. PM22 #21
Contract AF19 628 2390, Proj. 750
ESD TDR63 243 Unclassified report

Descriptors: (*Radar equipment, Tests), Radar tracking, Antenna components, Klystrons, Voltage regulators, Transmitter receivers, Doppler systems, Phase measurement, Analog systems, Delay lines, Correlators.

This document centers about the design and fabrication of an experimental test-bed radar facility which will be used to test and evaluate the applicability of certain radar techniques and components to high-power, long-range radar problems. Complementary activities include work leading to improved radar components. (Author)

AD-413 897 Div. 8
(TISTE/PAR) OTS price $4.60

Lewis, E. B. Co., Inc., East Hartford, Conn.
PRODUCTION ENGINEERING MEASURES CRYSTAL UNIT CR-(XM-46)/U.
Quarterly rept. no. 3, 1 Feb-1 May 63,
by Robert P. McComb. 1 May 63, 26p.
Contract DA36 039sc86737
Unclassified report

Descriptors: (*Crystal filters, Production), Crystals, Measurement, Very high frequency, Quartz, Plating, Chemical milling, Capacitance, Resistance (Electrical), Manufacturing methods, Quality control.

Test data for 30 AT Cut crystals operating on the third overtone for filter application at 30 mc is given. The initial design and parameter measurements for AT Cut crystals operating on the third overtone for filter application at 45 and 60 mc is given. (Author)

AD-413 902 Div. 8
(TISTE/AAR) OTS price $1.10

Foster, John J. Mfg. Co., Costa Mesa, Calif.
(No title).
Final rept.,
by L. F. Elliott. 1 Apr 63, 7p.
Contract NOw61 0512f
Unclassified report

Progress and achievements made in manufacturing research and development of STRESSKIN, an all resistance welded stainless steel honeycomb sandwich panel.

Descriptors: (*Sandwich panels, Stainless steel), Engineering, Scientific research, Welding, Electrodes, Cooling.

AD-413 998 Div. 8
(TISTE/JWS) OTS price $4.20

Sylvania Electric Products Inc., Waltham, Mass.
ACTIVE THIN-FILM TECHNIQUES MICROMIN PROGRAM.
Interim development rept. no. 4, 23 Mar-22 July 63,
by Egons Rasmanis and James Cline. 20 Aug 63, 1v. Rept. no. Q445 4
Contract NObsr87633, Task 9631
Unclassified report

Descriptors: (*Transistors, Semiconducting films). (*Diodes (Semiconductor). Manufacturing methods). Silicon, Vacuum apparatus, Vapor plating, Computer logic, Aluminum compounds, Oxides, Impurities, Aluminum, Antimony, Electron microscopy, Gain, Microminiaturization (Electronics).

The purpose of this investigation is to develop a process for depositing device-quality silicon and/or germanium films on polycrystalline insulating substrate by vacuum evaporation of silicon and/or germanium and to form thin film diodes and transistors in these films. During this period, npn transistor structures were vacuum deposited through masks by using silicon doped by simultaneous evaporation of either antimony or aluminum. The alphas of such vacuum

deposited thin film silicon transistors varied from 0.90 to 0.93, and grounded emitter current gains, betas, varied from 2 to 10 at V sub ce - 5V and I sub B = 0.1 ma. Diode AND/OR gates were deposited using two silicon layers, a silicon monoxide insulating layer and evaporated nickel contacts. Each 1/2 inch X 1/2 inch alumina substrate had two functioning AND/OR gates with six inputs each. This was the first demonstration of a working all-thin film circuit using silicon devices. Electron microscopy and electron diffraction studies of vacuum deposited rheotaxial silicon films continued, and results during this quarter showed that increasing the substrate temperature to 1000 C increases the average size of aggregates to two microns and crystallites to 1500A. (Author)

AD-414 088 Div. 8, 30
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COORDINATION OF ACTIVITIES IN THE FIELD OF ELECTRONIC MEASURING INSTRUMENTS,
by V. A. Normets. 22 June 63, 6p.
FTD TT63 570 Unclassified report

Trans. from Priborostroyeniye, No. 4, p. 29, 1963.

Descriptors: (*Measuring devices (Electrical and electronic). Production). Laboratory equipment.

9. FLUID MECHANICS

AD-411 821 Div. 9, 12, 30
(TISTP/RHR) OTS price $26.00

Boeing Co., Seattle, Wash.
DATA REPORT AEDC-B-BC-24, A MACH 8 HEAT TRANSFER AND PRESSURE TEST TO INVESTIGATE SHOCK BOUNDARY-LAYER INTERACTION ON A FLAT PLATE MODEL, AR-500M-2, SPO # 188,
by D. R. Trussell. 12 July 63, 521p. Document no. D2 22491 Vol. I
Contract AF33 657 7132
Unclassifieu report

Descriptors: (*Flat plate models, Turbulent boundary layer), (*Hypersonic flow, Flat plate models), Data, Heat transfer, Pressure, Heat-resistant materials, Models (Simulation), Boundary layer, Attitude indicators, Tests, Boost-glide vehicles, Spacecraft.

AD-411 822 Div. 9, 12, 30
(TISTP/AW) OTS price $28.50

Boeing Co., Seattle, Wash.
DATA REPORT AEDC-B-BC-24, A MACH 8 HEAT TRANSFER AND PRESSURE TEST TO INVESTIGATE SHOCK BOUNDARY-LAYER INTERACTION ON A FLATE PLATE MODEL, AR-500M-2, SPO #188,
by D. R. Trussell. 12 July 63, 658p. Rept. no. D2 22491, vol. II
Contract AF33 657 7132
Unclassified report

Descriptors: (*Flat plate models, Turbulent boundary layer), (*Hypersonic flow, Flat plate models), Data, Heat transfer, Pressure, Boost-glide vehicles, Models (Simulations), Boundary layer.

AD-411 823 Div. 9, 12, 30
(TISTP/RHR) OTS price $28.50

Boeing Co., Seattle, Wash.
DATA REPORT AEDC-B-BC-24, A MACH 8 HEAT TRANSFER AND PRESSURE TEST TO INVESTIGATE SHOCK BOUNDARY-LAYER INTERACTION ON A FLAT PLATE MODEL, AR-500M-2, SPO #188.
9 July 63, 1v. D2 22491, Vol. 3
Contract AF33 657 7132
Unclassified report

Descriptors: (*Flat plate models, Turbulent boundary layer), (*Hypersonic flow, Flat plate models), Data, Heat transfer, Pressure, Booster-glide vehicles, Models (Simulation), Boundary layer, Attitude indicators, Heat-resistant materials, Spacecraft, Boost-glide vehicles.

AD-411 996 Div. 9, 27
(TISTP/JP) OTS price $12.00

Stanford U., Calif.
A STUDY OF THE FLUID DYNAMICS AND HEAT TRANSFER BEHAVIOR FOR RADIALLY INWARD FLOW OVER A SHROUDED ROTATING DISK,
by J. W. Mitchell. 30 Apr 63, 144p. TR57
Contract Nonr22523, Proj. NR090342
Unclassified report

Descriptors: (*Gas turbine rotors, Heat transfer), (*Gas flow, Gas turbine rotors), Velocity, Gas turbines, Fluid flow, Air, Rotation.

The modeling of radial flow gas turbine fluid dynamics and heat transfer behavio is investigated. A test facility was constructed for the modeling of turbine flows. Several unconventional experimental techniques were developed for use in the facility. A simple model of a radial flow gas turbine was analyzed and tested. The fluid dynamics and heat transfer behavior of a single radially inward flow of air over a shrouded rotating disk was experimentally determined. The fluid dynamics behavior is presented as a series of graphs detailing the velocity profiles. The heat transfer is correlated over the operating range of radial flow gas turbines by a simple algebraic relation between the governing nondimensional parameters. An analysis is presented that does not adequately predict the heat transfer. The reasons for the discrepancy between analysis and experiment are discussed. (Author)

AD-412 291 Div. 9, 25
(TISTP/MFA) OTS price $4.60

Institute of Engineering Research, Indiana U., Berkeley.
THE EXPERIMENTAL DETERMINATION OF FORCES AND PRESSURES ACTING ON A HEMISPHERE OSCILLATING ON A FREE SURFACE,
by Richard A. Cumming. Mar 63, 42p. NA63 1
Contract Nonr22230
Unclassified report

Descriptors: (*Hemispherical shells, Pressures), (*Boundary value problems, Potential theory), Harmonic analysis, Hydrodynamics, Surfaces, Flotation, Oscillation, Motion, Fluids, Models (Simuations), Tanks (Containers), Generators, Pressure gages, Calibration, Recording systems, Measurement, Tests.

The exciting force and pressure distribution for a hemisphere undergoing forced harmonic oscillations on the free surface were determined. The added mass and damping coefficients were computed from both the integrated pressures and the direct force measurements. There is a certain amount of disagreement between the results of the two methods. The results are compared to the predictions of the linearized hydrodynamic theory as computed by W. R. Porter but, due to the lack of agreement in the experimental results, quantitative judgements cannot be made. Qualitatively, it is believed that the results are in agreement with the predictions of linearized theory. (Author)

AD-412 301 Div. 9
(TISTP/RLG) OTS price $3.60

ITT Research Inst., Chicago, Ill.
TURBULENT FLOW TRANSITION NEAR SOLID AND FLEXIBLE BOUNDARIES,
by Henry B. Karplus. Mar 63, 38p. Rept. no. IITRI1205 4
Contract Nonr368200
Unclassified report

Descriptors: (*Laminar flow, Turbulence), (*Surfaces, Structures), Anemometers, Viscosity, Velocity, Fluid flow, Time, Scale, Measurement, Test facilities.

A technique was devised for studying the transition from laminar to turbulent flow conditions using a hot film anemometer. Flow in a channel starts out uniformly laminar and breaks up into random bursts of ''turbulence'' as the fluid progresses through the channel. A degree of turbulence is defined as the total fractional time occupied by the turbulence bursts. This increases on a sigmoidal curve levelling to a final value of unity when the turbulence is fully developed. Degree of turbulence in-

creases more rapidly near rigid walls than in the presence of flexible walls, however, for the range of flexible walls tried the turbulence starts sooner than for rigid walls. Flexible walls were backed by damping fluid. The greater the viscosity of the damping fluid the greater the delay to a start of the turbulence. A scale of turbulence is also defined in terms of the different frequency components of the velocity fluctuations divided by the mean flow rate. The relative amplitude of the several components on this turbulence scale is affected only very slightly by the properties of the wall. (Author)

AD-412 378 Div. 9
(TISTP/FEM) OTS price $6.60

Defense Research Lab., U. of Texas, Austin.
DESIGN AND PERFORMANCE OF A VARIABLE GEOMETRY DIFFUSER FOR AN AXISYMMETRIC WIND TUNNEL,
by James Burley Kyser. 14 Feb 56, 1v. DRL370; CF2480
Contract NOrd16498, Task UTX2
Unclassified report

Descriptors: (*Axially symmetric flow, Wind tunnels), (*Wind tunnel models, Fluid flow), (*Diffusers, Performance (Engineering), Design, Supersonic flow, Boundary layer, Entropy, Shock waves, Pressure, Mechanical drawings, Tables, Wind tunnel nozzles, Geometry.

To prevent the larger second throat area required for starting a supersonic wind tunnel from penalizing the performance during the entire run, a diffuser was constructed with a movable centerbody. After the normal shock had been swallowed during starting, the centerbody was moved forward, thus constricting the flow area at the second throat. This allowed the normal shock, or shock system, to occur at a lower Mach Number, and therefore, reduced the losses. (Author)

AD-412 412 Div. 9
(TISTP/TL) OTS price $4.60

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
A WAKE MODEL FOR FREE-STREAMLINE FLOW THEORY PART II. CAVITY FLOWS PAST OBSTACLES OF ARBITRARY PROFILE,
by T. Yao-tsu Wu and D. P. Wang. May 63, 34p.
Rept. no. 97 4
Contract Nonr220 35
Unclassified report

Descriptors: (*Wakes, Sheets), (*Fluid flow, Theory), (*Sheets, Cavitation), (*Flat rate model, Geometric form), Functional analysis, Equations, Wedges, Hydrofoils, Conformal mapping, Special functions, Integral equations.

A free-streamline wake model is introduced to treat the fully and partially developed wake flow or cavity flow past an oblique flat plate. This theory is generalized here to investigate the cavity flow past an obstacle of arbitrary profile at an arbitrary cavitation number. Consideration is first given to the cavity flow past a polygonal obstacle whose wetted sides may be concave towards the flow and may also possess some gentle convex corners. The general case of curved walls is then obtained by a limiting process. The analysis in this general case leads to a set of two functional equations for which several methods of solution are developed and discussed. As a few typical examples the analysis is carried out in detail for the specific cases of wedges, two-step wedges, flapped hydrofoils, and inclined circular arc plate. For these cases the present theory is found in good agreement with the experimental results available. (Author)

AD-412 419 Div. 9, 25
(TISTP/MFA) OTS price $5.60

Bureau D'Analyse et de Recherche Appliquees (France).
ANALOG STUDY OF IMMERGED PROFILES IN PROXIMITY OF THE FREE SURFACE WITH A SURIMPOSED LOAD DISTRIBUTION.
Final rept.
30 Dec 62, 35p.
Contract N62558 2545
Unclassified report

Descriptors: (*Fluid flow, Perturbation theory), (*Surfaces, Analysis), Numerical analysis, Vortices, Analog systems, Partial differential equations, Velocity, Statistical distributions, Pressure, Thickness, Boundary layers, Functions, Sheets, Tanks (Containers), Loading (Mechanics).

AD-412 486 Div. 9
(TISTP/AW) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
HIGH SPEED LOW DENSITY FLOW NEAR THE STAGNATION POINT OF A BLUNT BODY,
by Reuben Ru-ren Chow. May 63, 49p.
Contract AF33 616 7661, Proj. 7064, Task 7064 01
ARL 63 75 Unclassified report

Report on Aerothermodynamic Investigations in High Speed Flow..

Descriptors: (*Boundary layer, Blunt bodies), (*Hypersonic flow, Heat transfer), Shock waves, Density, Errors, Equations, Stagnation point, Laminar boundary layer, Theory.

The boundary layer thickness around a blunt-nosed body increases as the Reynolds number decreases. When this thickness reaches a magnitude of the order of the inviscid shock detachment distance, the heat fluxes and the components of stresses after the shock begin to play important roles in the flow field behind the shock. These effects necessitate the modification of the usual Rankine-Hugoniot shock conditions in the study of the energy transfer between the fluid and the body surface. In the present analysis the leading order shock conditions are obtained from the systematic order of magnitude analysis. A complete matching scheme for the components of heat flux and stresses between the shock and the boundary layer is proposed for the study of the flow field as well as the surface heat transfer to the body. No postulation, except the axial symmetry, has been made concerning the shape of the shock. The shape of the matching surface can be obtained uniquely from the present analysis. A method of solution has been introduced so that the laborious job of numerical integration of the flow equations with complicated boundary conditions can be bypassed. The governing equations are transformed and reduced to algebraic forms with the knowledge of the usual similarity solutions of the boundary layer equations. (Author)

AD-412 651 Div. 9
(TISTA/GEC) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
FORCE TESTS OF STANDARD HYPERVELOCITY BALLISTIC

MODELS HB-1 AND HB-2 AT MACH 1.5 TO 10,
by J. Don Gray and E. Earl Lindsay. Aug 63, 32p.
Contract AF40 600 1000, Proj. VT2116
AEDC TDR63 137 Unclassified report

Descriptors: (*Nose cones, Aerodynamic characteristics). (*Reentry vehicles, Aerodynamic characteristics). Flared afterbodies, Hypersonic characteristics, Supersonic characteristics, Load distribution, Hypervelocity projectiles, Blunt bodies, Reynolds number, Schlieren photography, Stability.

The aerodynamic characteristics of two standard, hypervelocity, ballistic-type models, designated HB-1 and HB-2 were investigated in the supersonic and hypersonic regimes. The tests were conducted at nominal Mach numbers of 1.5, 2, 3, 4, 5, 8, and 10 at Reynolds numbers from 0.07 to 2.55 x 10 to the 6th power, based on body diameter, and through an angle-of-attack range from -2 to 15 deg. The effects of Mach number, Reynolds number, and model attitude on the static stability and axial-force characteristics of the two configurations were investigated. The zero-lift, forebody, axial-force coefficient, CA, for both configurations was found to be sensitive to Reynolds number variations; whereas the initial normal-force curve slope, CN alpha, and center-of-pressure, xcp/l, for only the flared-tail model (HB-2) were dependent upon the Reynolds number. (Author)

AD-412 725 Div. 9
(TISTA/GEC) OTS price $5.60

General Electric Co., Philadelphia, Pa.
SLENDER BODY NEAR WAKE DENSITY MEASUREMENTS AT MACH NUMBERS THIRTEEN AND EIGHTEEN,
by E. P. Muntz and R. E. Zemple. 24 July 63, 42p. Document no. 63SD718
Contracts AF04 647 617 and AF04 694 222
Unclassified report

Descriptors: (*Slender bodies, Wake), Hypersonic flow, Stagnation point, Model tests, Pressure, Enthalpy, Nitrogen, Gas flow, Super aerodynamics, Hypersonic characteristics, Density, Test methods, Electroluminescence, Shock tubes, Measurements, Experimental data, Electron beams, Theory.

The flows behind slender bodies moving at hypersonic speeds were studied. One region where both theoretical and experimental difficulties are encountered is immediately downstream of the body base--the part of the flow referred to as the near wake. Density measurements were made behind a 3/4 power law body at Mach 13 and 18. The density measurements were used together with calculated pressures to estimate the enthalpies for the near wakes generated in the experiments. The tests were conducted in nitrogen, and at relatively low stagnation enthalpies. (Author)

AD-412 726 Div. 9, 25, 8
(TISTP/FEM) OTS price $1.60

General Electric Co., Philadelphia, Pa.
AN ELECTRON BEAM EXCITATION TECHNIQUE FOR THE MEASUREMENT OF LOW DENSITIES IN HYPERSONIC SHOCK TUNNEL FLOWS,
by R. Zempel, J. Mallin, and E. Muntz.
1 Aug 63, 16p. Document no. 63SD707
Contract AF04 694 222
Unclassified report

Descriptors: (*Electron beams, Hypersonic flow), (*Hypersonic wind tunnels, Measurement), (*Hypersonic flow, Density), Excitation, High altitude, Flight simulators, Shock waves, Theory, Gases, Nitrogen, Molecules, Energy, Emissivity, Photomultipliers, Electron guns, Optical instruments, Reentry vehicles, Enthalpy, Fiber optics, Instrumentation.

A moderately energetic electron beam (30 kev) is used to induce luminescence from the nitrogen molecules in a high speed gas flow. Local gas density may be measured from observation of the electroluminescent intensity. The method is ideally suited to low density hypersonic flows where, because the gas is so tenuous, the technique proves highly effective compared to shadowgraph or schlieren instrumentation. In the present case the technique was developed for the measurement of density in a hypersonic shock tunnel. The ability to make accurate, quantitative measurements of density is useful in probing a shock tunnel's free stream flow. Also, interesting investigations of the flow in the near wake region of a model may be undertaken using the electron beam. (Author)

AD-412 737 Div. 9
(TISTP/FEM) OTS price $7.60

Michigan U., Coll. of Engineering, Ann Arbor.
THE EFFECT OF THE BOUNDARY LAYER UPON THE FLOW IN A CONICAL HYPERSONIC WIND TUNNEL NOZZLE,
by Martin. Sichel. July 63, 1v. 02953 2 F
Contract Nonr122431, Proj. NR061108
Unclassified report

Descriptors: (*Hypersonic nozzles, Hypersonic flow), (*Hypersonic wind tunnels, Boundary layer), Integral equations, Experimental data, Thickness, Equations, Reynolds number, Air, Density.

Integral equations for the flow in a conical hypersonic nozzle with a thick boundary layer have been formulated and some approximate solutions of these equations have been studied. A method developed by Burke for calculating boundary layer thickness using empirical correlations has been extended to a relatively broad range of stagnation conditions and has been used to compute the effect of boundary layer development upon hypersonic nozzle flow. (Author)

AD-412 771 Div. 9, 15
(TISTP/WH) OTS price $2.60

Johns Hopkins U., Baltimore, Md.
THE INITIAL-VALUE PROBLEM FOR LONG WAVES OF FINITE AMPLITUDE,
by Robert R. Long. July 63, 23p. Technical rept. no. 14 (ONR Series); Technical rept. no. 17 (CWB Series)
Contract Nonr401001, Proj. NR082 104 11 2 62
Unclassified report

Descriptors: (*Partial differential equations, Water waves), (*Water waves, Partial differential equations), Integration, Numerical methods and procedures, Propagation, Hydrology.

Derived herein is a set of partial differential equations governing the propagation of an arbitrary, long-wave disturbance of small, but finite amplitude. The equations reduce to that of Boussinesq (1872) when the assumption is made that the disturbance is propagating in one direction only. The equations are hyperbolic

with characteristics curves of constant slope. The initial-value problem can be solved very readily by numerical integration along characteristics. A few examples are included. (Author)

AD-412 787 Div. 9, 25
(TISTP/MFA) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EXPERIMENTAL AERODYNAMIC DATA CONCERNING VORTEX FLOW AND THE GAS VELOCITY IN A SMALL C-C ARC HEATER OPERATED WITH ARGON,
by L. E. Rittenhouse, E. E. Anspach, and M. H. Nesbitt. July 63, 27p.
Contract AF40 600 1000, ARO Proj. PL2287
AEDC TDR63 124 Unclassified report

Descriptors: (*Heaters, Argon), (*Nozzles, Vortices), (*Electric arcs, Gases), Plasma medium, Gas ionization, Magnetohydrodynamics, Aerodynamic characteristics, Gas flow, Injection, Jet mixing flow, Pressure, Velocity.

The performance characteristics of a small d-c arc heater of the Gerdien type are analyzed with and without a vortex flow in the nozzle. Moreover, total pressure profiles taken in the plasma and static pressure distributions along the nozzle are presented and used to indicate the effects produced by the vortex in the nozzle. Injecting the working medium (argon) tangentially into the arc chamber was found to be an ineffective means for producing gas dynamic swirl due to the effects from heat addition in the nozzle. The data were obtained at chamber pressures from 1.72 to 5.15 atm and exhausting to atmosphere with power levels up to 22 kw. Two basically different methods are used to calculate the ''bulk'' gas temperature, which is required to calculate the gas velocity. The first method makes use of several measured quantities to perform an energy balance on the arc heater. The second method makes use of the conventional weight-flow equation for sonic flow. The total pressure and total temperature at the sonic point (nozzle exit) were obtained from the Rayleigh heat-addition equations. A comparison of the velocities calculated by the two methods reveals agreement within ten percent at the nozzle exit. (Author)

AD-412 792 Div. 9, 30
(TISTA/LSK) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGH SPEED AERODYNAMICS (SELECTED CHAPTERS),
by A. P. Mel'nikov. 20 June 63, 88p.
FTD TT63 394 Unclassified report

Trans. from Aerodinamika Bol'shikh Skorostey, Voyennoye Izdatel'stvo Ministerstva Oborony SSSR. Moskva, pp. 94-132, 133-153, 1961.

Descriptors: (*Boundary layer, Aerodynamic characteristics), (*Aerodynamic loading, Aerodynamic characteristics), (*Transonic wind tunnels, Design), Friction, Aerodynamic heating, Stagnation point, Vortices, Turbulent boundary layer, Thickness, Separation, Laminar boundary layer, Turbulent boundary layer, Boundary layer transition, Incompressible flow, Heat transfer, Drag, Airfoils, Supersonic flow, Laminar flow.

Contents:
Boundary layer, Friction Resistance, and Aerodynamic Heating at High Flight Velocities.
Aerodynamic forces

AD-412 795 Div. 9, 25
(TISTM/TCG) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
THE INTERACTION OF MOVING SOURCE CURRENTS WITH A HYDROMAGNETIC FLUID,
by Richard A. Gerwin. Apr 63, 18p. Rept. no. D1 82 0254
Unclassified report

Also available from the author.

Descriptors: (*Hydrodynamics, Fluids), (*Fluids, Hydrodynamics), (*Compressible flow, Fluids), Magnetic fields, Hydrodynamic configuration, Density, Electric currents, Equations, Plasma physics.

An incompressible fluid of finite conductivity is assumed to be permeated by a uniform magnetic field. We calculate the field of an arbitrarily oriented, weak magnetic dipole moving along the direction of the uniform field. The results reduce to those of others in the limit of no uniform field sufficiently far from the source. The main result is that the far field of the dipole (the field outside of the wake) is the vacuum dipole field times the factor which includes the dipole speed and Alfven speed. A general theorem is proved: neglecting mechanically induced disturbances outside of the wake. It is also shown that an accurate treatment of the problem, when source speed is close to Alfven speed, requires the inclusion of displacement currents. (Author)

AD-412 800 Div. 9, 15
(TISTP/WH) OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON THE KUTTA-JOUKOWSKI CONDITION IN THE MAGNETO-FLUID DYNAMICS,
by K. Stewartson. June 63, 42p. Technical summary rept. no. 399
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Magnetohydrodynamics, Aerodynamic characteristics), Fluid mechanics, Fluid flow, Lift, Differential equations, Wake.

The effect of an aligned magnetic field H_∞ on the lifting force, experienced by a flat plate at incidence in a conducting fluid, is examined with respect to variations in the conductivity σ and in H_∞. The governing integral equation does not possess a unique solution unless the velocity is required to be finite either at the trailing edge or at the leading edge of the plate. It is then solved numerically for various finite values of σ and its asymptotic behavior is examined analytically. The conclusions are: if the undisturbed fluid velocity $V > \frac{H_\infty}{\sqrt{H\pi\rho}}$, the Alfven speed whichever side condition is imposed at finite σ, the solution as $\sigma \to \infty$ formally satisfies the same condition. If $V < \frac{H_\infty}{\sqrt{4\pi\rho}}$ and the velocity is required to be finite at the trailing edge, as $\sigma \to \infty$ the velocity formally becomes finite at the leading edge and develops a quasi-singular behavior at the trailing edge. On the other hand if $V < \frac{H_\infty}{\sqrt{4\pi\rho}}$ and the velocity is required to be finite at the leading edge the solution appears to become pathological as $\sigma \to \infty$. The critical case $V = \frac{H_\infty}{\sqrt{4\pi\rho}}$ is also examined. (Author)

AD-412 883 Div. 9
(TISTM/BRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASURING THE INSTANTANEOUS RATES OF FLOW OF A LIQUID BY AN ELECTRO-THERMO-ANEMOMETER AND THE METHOD OF ELECTROMAGNETIC INDUCTION,
by M. G. Selyaninov. 20 June 63, 12p.
FTD TT63 482
Unclassified report

Trans. from Novyye Metody Izmereniy i Pribory Dlya Gidravlicheskikh Issledovaniy, Izdatel'stvo Akademii Nauk SSSR, Moscow, pp. 49-55, 1961.

Descriptors: (*Fluid flow, Measurement), (*Anemometers, Design), Films, Heat transfer, Resistance (Electrical), Amplifiers, Electromagnetic pulses, Instrumentation.

AD-412 890 Div. 9
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AERODYNAMIC HEATING,
by V. Votyakov and V. Shumyatskiy. 19 June 63, 5p.
FTD TT 63 390 Unclassified report

Trans. from Sovetskaya Aviatsiya, Moscow, 2p., 1959.

Descriptors: (*Airframes, Aerodynamic heating), Hypersonic characteristics, Heat transfer, Boundary layer, Shock waves, Thermal radiation, Guided missiles (Surface to surface), Surface temperatures, Density.

At the surface of a flying apparatus, travelling in the atmosphere at greater than sonic speed, is formed an air layer of higher temperatures. It is ordinarily called thermal boundary layer. The greater the flight speed the higher is the temperature of the boundary layer. An explanation is presented for the fact thut the skin of the flying apparatus has a much lower temperature than the boundary layer of the air. The fact is that the heating process is not instantaneous. The rate of heat transfer from the air to the surface of the flying apparatus depends upon a series of factors. The decisive one of these is the density of the air itself. (Author)

AD-412 897 Div. 9, 22
(TISTP/FEM) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
STUDIES OF A VENTILATED SUPERCAVITATING PROPELLER ON A TORPEDO TEST VEHICLE. PART 3. WATER-TUNNEL AND FINAL CABLEWAY TESTS, AND OVER-ALL SUMMARY OF THE PROJECT,
by J. W. Hoyt. June 63, 18p.
NAVWEPS rept. 7628, pt. 3; NOTS TP 3229
Unclassified report

Descriptors: (*Torpedo components, Propellers (Marine)), (*Torpedo noise, Cavitation noise), Tests, Ventilation, Water tunnels, Test vehicles, Torpedoes, Cavitation.

A full-scale torpedo test vehicle equipped with a ventilated supercavitating propeller was studied in the Garfield Thomas Water Tunnel at the Pennsylvania State University to obtain performance information and observe details of ventilation flow. A peak efficiency of 70% was obtained near the operating advance ratio. Visual observations indicated improper ventilation of the propeller cavity. However, subsequent runs on the underwater cableway with the modified propeller gave improved acoustic results. (Author)

AD-412 933 Div. 9, 15
(TISTP/MFA) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
A LINEARIZED ANALYSIS OF THE PRESSURE WAVES IN A TANK UNDERGOING AN ACCELERATION,
by F. Edward Ehlers. July 63, 9p. Mathematical note no. 308
Unclassified report

Also available from the author.

Descriptors: (*Pressure vessels, Fluid flow), (*Tanks (Containers), Analysis), Acceleration, Equations, Rocket motor nozzles, Pressure, Time, Functions, Sound, Velocity.

The rapid acceleration experienced by a rocket with a high thrust to weight ratio influences the rate of flow through the nozzle, thereby altering the thrust. To obtain some insight into the effects of acceleration on fluid flows, the linearized equations for the one-dimensional flow in a closed tank are solved for the acceleration prescribed as a known function of time. The wave pattern is described in detail for the flow induced by an instantaneous constant acceleration beginning at time. (Author)

AD-412 974 Div. 9, 25
(TISTP/FEM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS CONCERNING THE MOVEMENTS OF A CONDUCTIVE VISCOUS GAS IN THE PRESENCE OF MAGNETIC AND ELECTRIC FIELDS,
by V. P. Shidlovskiy. 7 June 63, 9p.
FTD TT63202 Unclassified report

Trans. from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No. 5, pp. 10-15, 1961.

Descriptors: (*Gases, Motion), (*Electromagnetic fields, Gases), Fluid flow, Cylindrical bodies, Viscosity, Magnetic fields, Electric fields, Laminar flow, Heat transfer coefficient, Momentum.

Problems of stable laminary flow of gas between two infinitely long coaxial cylinders, rotating uniformly at different angular velocities are discussed. Two variants of the arrangement of electric and magnetic field vectors, E and H are discussed. The electric field in the first variant appears to be radial, and the magnetic field axial; in the second variant there are axial electric fields and an annular magnetic field, the vector of which is everywhere parallel to the velocity vector of the flow. (Author)

AD-413 024 Div. 9
(TISTM/REB) OTS price $12.00

Institute of Engineering Research, U. of Calif., Berkeley.
RECENT DEVELOPMENTS IN FREE-SURFACE FLOWS,
by John V. Wehausen. June 63, 166p. Rept. no. NA63 5
Contract Nonr22230
Unclassified report

Division 9 - FLUID MECHANICS

Descriptors: (*Fluid flow, Surfaces), (*Surfaces, Fluid flow), Jets, Gravity, Equations, Numerical analysis, Theory, Mechanical waves, Boundary layer, Fluids, Fluid mechanics, Cavitation.

The following report attempts to present a self-contained exposition of the developments in the theory of gravity waves and of jets and cavities which have taken place during the last five or six years, i.e., since the manuscripts were finished for the article Jets and Cavities, by D. Gilbarg and the article Surface Waves, by E. Laitone and the author for volume 9 of the Encyclopaedia of Physics, (Springer, Berlin, 1960). (Author)

AD-413 074 Div. 9
(TISTP/FEM) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HYPERSONIC FLOW PAST AXISYMMETRIC BODIES FLYING AT AN ANGLE OF ATTACK,
by B. B. Minostsev. 14 June 63, 20p.
FTD TT63 406 Unclassified report

Trans. from Issledovaniya po Mekhanike i Prikladnoy Matematike, Trudy Instituta, 7, pp. 136-151, 1961.

Descriptors: (*Hypersonic flow, Boundary layer), (*Angle of attack, Axially symmetric flow), Density, Motion, Velocity, Supersonic characteristics, Shock waves, Gases, Partial differential equations, Differential equations, Operators (Mathematics), Pressure, Blunt bodies.

The solution of the problem of the flow of an ideal gas moving at high supersonic velocity past axisymmetric bodies at angle of attack is presented. The problem was solved by expanding the unknown characteristics of the flow into a series with respect to parameter epsilon = (gamma - 1)/(gamma + 1). The problem was solved in the first approximation in quadratures. (Author)

AD-413 095 Div. 9
(TISTE/JWS) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
HYDRAULIC TENSION COMPRESSION FATIGUE MACHINE,
by Regis M. N. Pelloux and S. D. Brooks.
July 63, 28p. Rept. no. D1 82 0268
Unclassified report

Also available from the author.

Descriptors: (*Test equipment, Fatigue (Mechanics)), (*Fatigue (Mechanics), Test equipment), Test methods, Stresses, Strain (Mechanics), Test equipment (Electronics), Deformation, Instrumentation, Calibration, Hysteresis, Recording systems.

A tension - compression fatigue machine was designed and built which permits fatigue testing under controlled uniaxial stress or strain amplitudes with zero, positive or negative mean stress or strain amplitudes with zero, positive or negative mean stress or strain. The stress or strain amplitudes can be varied continuously during a test in order to perform increasing stress or strain amplitude fatigue tests. Recording of the stress or strain levels and of the stress-strain hysteresis loops is done by means of an oscilloscope and/or an X-Y recorder. The hydraulic system, the instrumentation and the command, control and read-out electronic systems are described in cdetail. Some results which are representative of the applications of the fatigue machine are described. (Author)

AD-413 119 Div. 9, 15
(TISTM/ODN) OTS price $3.60

Polytechnic Inst. of Brooklyn, N. Y.
ABLATION OF A CYLINDRICAL CAVITY IN AN INFINITE MEDIUM,
by S. V. Nardo. May 63, 25p. Rept. no. PIBAL662
Contract Nonr83923, Proj. NR064 433
Unclassified report

Descriptors: (*Cylindrical bodies, Ablation), (*Ablation, Cylindrical bodies), Acrylic resins, Hemispherical shells, Mathematical analysis, Nonlinear differential equations, Thermal conductivity.

An approximate solution is presented for the ablation of a cylindrical cavity in an infinite medium. The spatial variation of temperature in the unablated solid is assumed in the form of an exponential, and a heat balance integral technique is used to satisfy the heat conduction equation on the average. The solution is in the form of a second order, nonlinear ordinary differential equation in the position of the ablating surface. The results of a numerical integration of the nonlinear equation are compared with the total ablation measured at the stagnation point of a Plexiglas hemisphere tested in a hypersonic environment. A discussion of the approximate method, and the comparison with the test on the Plexiglas hemisphere appears in the body of the paper. (Author)

AD-413 125 Div. 9
(TISTM/EJH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ENGINEERING JOURNAL (SELECTED ARTICLES).
20 June 63, 28p.
FTD TT63 509 Unclassified report

Trans. from Inzhenernyy Zhurnal, 1:3, pp. 60-64, 153-156, and 161-165, 1961.

Descriptors: (*Aerodynamic configurations, Gas flow), (*Gas flow, Aerodynamic configurations), (*Kinetic theory, Mathematical analysis), (*Supersonic flow, Electric discharge), Shock waves, Electric discharge.

AD-413 165 Div. 9
(TIS/A/GEC) OTS price $9.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
IONIZATION NONEQUILIBRIUM EFFECTS ON THE MAGNETOGASDYNAMIC INTERACTION IN THE STAGNATION REGION OF AN AXISYMMETRIC BLUNT BODY,
by Donald W. Boyer. June 63, 91p. Rept. no. AG1547Y1
Contract AF33 616 8055
ASD TDR62 1078 Unclassified report

Descriptors: (*Blunt bodies, Hypersonic flow), (*Hypersonic nozzles, Gas flow), Shock waves, Enthalpy, Gas ionization, Magnetohydrodynamics, Magnetic fields, Stagnation point, Thermodynamics, Numerical analysis.

Exact numerical calculations have been made of the effects of finite rate chemical and ionization processes in hypersonic nozzle and axisymmetric blunt body flows pertinent to experimental magnetogasdynamic studies. The results have shown that the electrical properties of the nonequilibrium airflows are inadequate for the attainment of observable MGD effects unless very high magnetic field strengths are used. Numerical calculations of the effects of seeding such

flows have shown that small amounts of seed material, insufficient to influence the gasdynamic and chemical properties of the flow, may result in the attainment of magnetic interaction parameters of significance for the performance of MGD experiments in hypervelocity facilities. Numerical solutions of the axisymmetric nonequilibrium MGD-shock layer interaction are described. The results were obtained by the inverse method of solution and demonstrate a significant magnetic effect in seeded airflows for moderate (2500 gauss) field strengths. The solutions indicate that both the shock stand-off distance and radius of curvature increase with the strength of the interaction. The pressure distribution around the body was found to increase above the Newtonian result with increase of field strength.

AD-413 397 Div. 9
(TISTP/WH) OTS price $1.10

Stanford U., Calif.
COMPUTATION OF THE LAMINAR COMPRESSIBLE BOUNDARY LAYER.
Report for 15 May 62-15 May 63,
by Irmgard Flugge-Lotz. 8 July 63, 4p.
Grant AF AFOSR62 242
AFOSR 5129 Unclassified report

Descriptors: (*Laminar boundary layer, Compressible flow), (*Compressible flow, Laminar boundary layer), Difference equations, Differential equations, Fluid mechanics.

AD-413 419 Div. 9
(TISTA/LSK) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
SLENDER-AIRFOIL CAMBERLINES WITH TRAPEZOIDAL LIFT DISTRIBUTIONS,
by M. L. Sturgeon. June 63, 32p.
NAVWEPS Rept. 8092; NOTS TP3145
Unclassified report

Descriptors: (*Propellers (Marine), Cavitation), Slender bodies, Airfoils, Camber, Lift, Theory, Equations, Mathematical analysis, Two-dimensional flow, Load distribution, Thickness.

Nondimensional analytical equations are developed from slender-airfoil theory to define the shape and the lift characteristics of a mean-line camber that will give a thin lifting surface some arbitrary trapezoidal lift distribution in two-dimensional invicid flow. The camber-line data for some particular lift distributions are tabulated as design aids. (Author)

AD-413 452 Div. 9
(TISTP/WH) OTS price $5.60

Princeton U., N. J.
HEAT TRANSFER IN OSCILLATING FLOW,
by R. C. Saunders and D. T. Harrje. 1 July 63, 1v. AER483 d
Contract Nonr185829
Unclassified report

Descriptors: (*Compressible flow, Heat transfer), (*Heat transfer, Compressible flow), Velocity, Oscillation, Fluid mechanics, Ducts.

Velocity oscillations (associated with pressure oscillations) when imposed upon a compressible fluid in a duct produce increases in the heat transfer between the fluid and the duct. Under certain conditions these increases can be substantial. A limited experimental investigation of the nature of these increases is treated. The design principles and capabilities of the elaborate experimental apparatus required to accurately survey the heat transfer in a duct at resonant conditions are described. Resonant oscillations in a duct were used to achieve sufficient oscillating amplitudes. The flow characteristics and parametric variations were investigated on at least one-half of a standing wave for all frequencies used. The heat transfer was found to be affected by three-dimensional effects as well as the longitudinal variations, and when such conditions existed, the heat transfer could not be predicted by any simple relationship. (Author)

AD-413 515 Div. 9, 25
(TISTP/WH) OTS price $6.60

General Electric Co., Schenectady, N. Y.
ON THE DISPERSED TWO-PHASE FLOW IN THE LAMINAR FLOW REGIME.
Final rept.,
by Novak Zuber. Jan 63, 52p. 63GL50
Contract AF49 638 1153
AFOSR 4632 Unclassified report

Descriptors: (*Laminar flow, Particles), (*Fluid dynamic properties, Turbulence), Sedimentation, Fluid mechanics, Viscosity, Ducts, Drag, Motion, Partial differential equations, Turbulent boundary layer.

The time-dependent, dispersed, two-phase flow problem for the laminar flow regime is formulated. In agreement with Burgers' description of the flow, the analysis takes into account the effect of both the motion and the presence of other particles. The steady-state solution of the governing set of equations is applied to an analysis of sedimentation and of fluidization (batch, cocurrent and countercurrent). Good agreement with experimental data is shown. The steady-state results give a formulation and a confirmation of the basic premise in the theory of Elgin and Lapidus for vertical two-phase flow systems. The theory of kinematic waves proposed by Kynch and by Lighthill and Whitham is used to analyze the transient response, i.e., the diffusion process, and to predict the diffusivity in two-phase flow. The kinematic wave theory is used also to predict the operating limits imposed on the system by the flooding phenomenon. (Author)

AD-413 533 Div. 9
(TISTA/GEC) OTS price $5.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
HYPERSONIC LAMINAR WAKES AND TRANSITION STUDIES (TASKS 3.1 AND 3.5 -- REST PROJECT),
by A. J. Pallone, J. I. Erdos, J. Eckerman and W. McKay. 14 June 63, 62p. Rept. no. RAD TM63 33
Contract AF04 694 239
Unclassified report

Descriptors: (*Conical bodies, Wakes), Hypersonic flow, Hypersonic characteristics, Slender bodies, Boundary layer transition, Laminar boundary layer, Mathematical analysis, Hypersonic test vehicles, Laminar flow.

This report presents the results of theoretical and experimental investigations of the flow in the wake of slender hypersonic vehicles. Nonsimilar solutions of the equations governing the far wake are obtained and contrasted with similar solutions and with solutions involving the Karman-Pohlhausen approach. Several numerical examples of the flow field in the wake generated by ballistic range models and by flight vehicles are presented. A series of ballistic range ex-

periments with conical models of 10, 15, and 27-1/2-degree half-angles are described. The model velocity ranges between 4,000 and 17,000 ft/sec with range pressures varying from 15 to 380 mm of Hg in air. The experimental data is discussed in detail and the analysis is used to compute and correlate appropriate transition parameters. Based on the correlation, transition in the wake of a 5-foot 12-degree half-angle cone at 22, 000 ft/sec is predicted to occur at approximately 20, 100, and 250 feet from the apex of the cone at altitudes of 100,000, 150,000 and 200,000 feet respectively. (Author)

AD-413 543 Div. 9
(TISTP/WH) OTS price $1.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
ON THE EQUATIONS OF SURF,
by R. E. Meyer and A. D. Taylor. July 63, 11p.
TR5
Contract Nonr562 34, Proj. NR083 167
Unclassified report

Descriptors: (*Water waves, Beaches), (*Fluid flow, Equations), Momentum, Hydrostatics, Integral equations, Nonlinear differential equations.

The two-dimensional motion of water on a beach of small slope, and rather close to shore, is shown to be governed to the first approximation by the non-linear shallow-water equations, if vorticity and viscous effects be neglected. (Author)

AD-413 55[illegible] Div. 9, 25
(TISTA/LSK) OTS price $8.60

General Dynamics Astronautics, San Diego, Calif.
SCALING OF ROCKET MOTOR EXHAUST OPTICAL RADIATION. PART I. SIMILARITY OF AEROTHERMOCHEMICAL STRUCTURE AND QUASI-EQUILIBRIUM RADIATION IN LAMINAR AND TURBULENT ROCKET EXHAUST PLUMES.
Semiannual rept.,
by R. J. Magnus. Jan 63, 96p. Rept. no. GDA 63 0441 1
Contract AF04 695 140
SSD TDR63 187 Pt. 1 Unclassified report

Descriptors: (*Rocket motors, Exhaust gases) (*Exhaust gases, Optical properties), Turbulence, Turbulent boundary layer, Model tests, Jet mixing flow, Shock waves, Boundary layer, Radiation measurement systems, Optical detector, Transport properties, Thermochemistry, Laminar boundary layer.

The formal conditions under which two rocket exhaust plumes might have similar distributions of temperature, composition, and velocity at corresponding points in the flow field and might present similar radiation characteristics to an external observation station were determined by the study of differential equations expected to provide a reasonable description of the physical phenomena involved. (Author)

AD-413 571 Div. 9, 14
(TISTE/AAR) OTS price $11.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HYDRAULIC POWER AMPLIFIERS,
by V. A. Khokhlov. 11 June 63, 141p.
FTD TT62 1226 Unclassified report

Descriptors: (*Amplifiers, Hydraulic systems), Fluid mechanics, Valves, Nozzles, Analysis, Feedback, Actuators, Design.

AD-413 581 Div. 9
(TISTP/WA) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MECHANICS AND MACHINE CONSTRUCTION (SELECTED ARTICLES),
by D. A. Mel'nikov and A. Ya. Cherkez. 5 June 63, 33p.
FTD TT63 375 Unclassified report

Trans. from Mekhanika i Mashinostroyeniye, Izvestiya Akademii Nauk SSSR. OTN. vol. 6, pp. 33-39 and 40-49, 1962.

Descriptors: (*Supersonic flow, Mathematical analysis), Shock waves, Gas cylinders, Gas flow, Nozzles, Pressure, Dynamics.

AD-413 592 Div. 9
(TISTA/FRL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE AERODYNAMIC CHARACTERISTICS OF GRAPHITE PARTICLES,
by Z. R. Gorbis and R. A. Bakhtiozin. 23 May 63, 8p.
FTD TT63 393 Unclassified report

Trans. from Izvestiya Uchebnykh Zavedeniy, Energetika, Vol. 11, pp. 101-104, 1961.

Descriptors: (*Particles, Graphite), (*Particles, Aerodynamic characteristics), Gas flow, Velocity, Test equipment.

The aerodynamic characteristics are reported of graphite particles. (Author)

AD-413 599 Div. 9
(TISTA/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ROLLING MOMENT OF FLAT WINGS IN AN OBLIQUE SUPERSONIC GAS FLOW,
by Yu. I. Krasil'nikov. 20 June 63, 17p.
FTD TT63 402 Unclassified report

Trans. from Inzhenernyy Sbornik, Institut Mekhaniki Akademii Nauk SSSR, Vol. 29, pp. 124-135, 1960.

Descriptors: (*Delta wings, Roll), (*Wings, Roll), Rectangular bodies, Aerodynamic configurations, Supersonic characteristics, Moments, Linear systems, Mathematical analysis, Pressure, Load distribution, Theory.

The coefficient of the rolling moment is determined for triangular, quadrangular, and pentagonal wings in an oblique supersonic gas flow. The problem is solved in a linearized set up by means of linear theory methods. (Author)

AD-413 600 Div. 9
(TISTP/FEM) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HERALD OF LENINGRAD UNIVERSITY; MATHEMATICS, MECHANICS, AND ASTRONOMY SERIES (SELECTED ARTICLES).
3 June 63, 61p.
FTD TT63 392 Unclassified report

Trans. from Vestnik Leningradskogo Universiteta; Seriya Matematiki, Mekhaniki, i Astronomii, No. 7, Issue 2, pp. 62-74, 87-104, and 105-116, 1962.

Descriptors: (*Supersonic flow, Conical wings), (*Wing body configurations, Theory), (*Conical wings, Fluid flow), Equations, Gas flow, Velocity, Pressure, Density, Boundary value problems, Hydrodynamics, Numerical methods and procedures, Partial differential equations, Aerodynamic characteristics, Differential equations, Angle of attack, Wings, Geometry, Integrals, Conical bodies, Shock waves.

By successive linearization of the equations for flow past conical wings an approximate solution for them is obtained, based on the possibility of reducing the linearized system to a wave equation. An approximate analytical solution is constructed for the system of ordinary differential equations for flow past specially shaped wings called developable wings. It is assumed that the gas is free of internal friction forces. The motion is assumed to be steady-state and adiabatic. The solution to the aforementioned equations is obtained taking into account quantities of the fourth order of smallness for thin, weakly curved, developable wings situated at a small angle of attack when the flow condition and the conditions at the attached discontinuity surfaces on the leading edge are satisfied. (Author)

AD-413 663 Div. 9, 26
(TISTA/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATION OF THE PRESSURE-HEAD CHARACTERISTICS OF AXIAL HELICAL IMPELLERS,
by V. I. Dumov. 11 June 63, 17p.
FTD TT63 407 Unclassified report

Trans. from Teploenergetika, Vol. 11, pp. 23-27, 1962.

Descriptors: (*Impellers, Fluid dynamic properties), Fluid flow, Cavitation, Pressure, Axially symmetric flow, Hydraulic systems, Feed pumps, Mathematical analysis, Centrifugal pumps.

A method of calculating the pressure-head characteristics of helical impellers is given, permitting us to determine the pressure-head and the rate of flow from a chosen configuration of the impeller. The results of experimental investigations to ascertain the dependence of the hydraulic losses on the fundamental geometrical and regime parameters of the impeller are reported. (Author)

AD-413 665 Div. 9, 14
(TISTB/AAR) OTS price $.50

Naval Research Lab., Washington, D. C.
PREVENTION OF LIQUID SPREADING OF CREEPING.
Interim rept.,
by Marianne K. Bernett and W. A. Zisman.
1 July 63, 7p.
Proj. RR001 01 43 4751
NRL Rept. no. 5959 Unclassified report

Presented at the Kendall Award Symposium, American Chemical Society on 2 Apr 1963, Los Angeles, Calif.

Descriptors: (*Liquids, Creep), Viscosity, Additives, Surface tension, Chemistry, Lubricants, Oils, Fluid flow, Fluid mechanics.

The spreading of liquids over solid surfaces can be prevented by three different approaches: (a) the liquid may be inherently nonspreading in its pure state, (b) the liquid can be made nonspreading by the addition of carefully selected solutes, or (c) the solid surface can be modified by coating it with substances of low surface energy. The present-day requirements for nonspreading oils for watches, fuses, and various types of indicating instruments are very stringent. Methods for fulfilling these requirements were examined in terms of the basic mechanism of spreading and wetting, the effect of chemical composition on spreading, and the use of oleophobic additives. The difficulties in obtaining appropriate liquids can be avoided by the alternative approach of modifying the solid surface. Monolayer coatings of some selected substances, although effective in the prevention of oil spreading, are sometimes too readily removed. Coatings of some fluorinated polymers however are easy to apply and remain effective when laid down in the form of a circular ring surrounding the oil drop. Thus, it becomes possible to employ any one of the many available spreading-type lubricating oils. (Author)

AD-413 707 Div. 9, 14
(TISTB/AAR) OTS price $1.10

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
LONGITUDINAL DIFFUSION ALONG THE NEPHRON DURING STOP FLOW,
by R. B. Kelman. July 63, 4p. TN BN325
Contract Nonr59517
Unclassified report

Descriptors: (*Fluid dynamic properties, Mathematical analysis), Diffusion, Fluid flow, Fluid mechanics, Analysis.

A mathematical analysis is presented which shows that during stop-flow experiments longitudinal diffusion of solute along the nephron is of too small a magnitude to interfer with the interpretation of data. (Author)

AD-413 756 Div. 9
(TISTP/FEM) OTS price $1.10

Sydney U., Australia.
WAVE INTERACTIONS IN STEADY SUPERSONIC AND HYPERSONIC FLOWS, DATED 19TH OCTOBER, 1960.
Final technical rept., July 61-Mar 62,
by G. A. Bird. Nov 62, 6p.
Grant AFOSR61 93
AFOSR 4779 Unclassified report

Descriptors: (*Supersonic flow, Shock waves), (*Hypersonic flow, Turbulence), Supersonic wind tunnels, Subsonic flow, Numerical analysis, Supersonic characteristics, Reflections, Entropy, Axially symmetric flow, Fluid flow, Pressure, Distribution, Temperature, Nose cones, Ionosphere, Blunt bodies, Charged particles, Magnetic fields, Electrostatics, Computers, Programming (Computers).

AD-413 846 Div. 9, 1, 30
(TISTA/VGW) OTS price $3.60

Wichita U., Kans.
TABULATED PRESSURE DATA FOR A SERIES OF CIRCULAR, ANNULAR JET GROUND EFFECT MACHINE MODELS,
by Claude A. Foltz and Hans E. W. Hoffmann.
July 62, 1v. Engineering rept. 352-8
Contract Nonr201 03
Unclassified report

Descriptors: (*Ground effect machines, Model tests), Aerodynamic slots, Annular nozzles, Wind tunnel models, Manometers, Pressure gages, Pressure, Experimental data, Tables.

Wind tunnel testing was conducted on nine circular, annular jet, ground effect machine models. The effects of slot width, convergence angle of the jet and operating height on the dynamic performance of this type of vehicle were inspected. Slot thickness to model diameter ratios of one, five and ten per cent were tested utilizing convergence angles of 0, 30 and 60 degrees. Accompanying this report are the tabulated pressure data for each slot width and convergence angle in 6 volumes. (Author)

AD-413 904 Div. 9
(TISTP/WH) OTS price $1.10

Johns Hopkins U., Baltimore, Md.
TURBULENT SHEAR FLOW.
Final rept., 1 July 57-31 Dec 62.
May 63, 7p.
Contract AF49 638 48
Unclassified report

Descriptors: (*Shear stresses, Gas flow), (*Gas flow, Turbulence), Jets, Fluid mechanics.

The initial problems were the effect of rotation (about the symmetry axis) on a round turbulent jet, and the effect of ''sweep back'' on a slot jet. The former was pursued with reasonable success; the latter proved too difficult a configuration to realize with precision. We therefore pursued the normal exit case in some detail. The radial turbulent jet was also studied. These may be the first measurements made in such a configuration. Finally, in order to permit a more basic study, we began the attempt to generate a nearly homogeneous turbulent shear flow. The technique is to introduce a non-uniform grid into a wind-tunnel test section. Preliminary work gave a fairly good, linear mean velocity profile, but the turbulence is still far from homogeneous. (Author)

AD-413 934 Div. 9
(TISTP/TL) OTS price $1.60

Hydrodynamics Lab., Calif Inst. of Tech., Pasadena.
AN APPROXIMATE NUMERICAL SCHEME FOR THE THEORY OF CAVITY FLOWS PAST OBSTACLES OF ARBITRARY PROFILE,
by T. Yao-tsu Wu and D. P. Wang. July 63, 11p.
Rept. no. 111 1
Contract Nonr 220 41
Unclassified report

Descriptors: (*Cavitation, Numerical analysis), (*Flatplate models, Wake), (*Fluid flow, Theory), Equations, Numerical methods and procedures, Integral equations, Fluid mechanics.

An approximate numerical scheme, somewhat like an engineering principle, is introduced which greatly shortens the computation of the dual functional equations while still retaining a high degree of accuracy of the numerical result. With such drastic simplification, it becomes feasible to carry out this approximate numerical scheme even with a hand computing machine. (Author)

AD-413 960 Div. 9, 1
(TISTA/VGW) OTS price $2.60

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
ANALYTICAL DETERMINATION OF LIFT CURVE SLOPE OF FINITE AIRFOILS - INCLUDING EFFECTS OF COMPRESSIBILITY,
by James George. Oct 47, 1v.
NAVWEPS Structures Project rept. no. 41
Unclassified report

Descriptors: (*Airfoils, Lift), Stabilizers, Tails (Aircraft), Compressible flow, Two dimensional flow, Aerodynamic characteristics, Mathematical analysis.

Test data are shown to give values of the lift-curve slope of wings of relatively small aspect ratios (such as tail surfaces) which are considerably less than the values determined by present methods of calculation which utilize ordinary lifting line theory. As a consequence control surface displacements greater than those determined by present methods of calculation are necessary to effect specified maneuvers. This is shown generally to result in greater stresses in the tail structure than would result with the control surface displacements determined by the present methods of calculation. Based upon lifting surface theory, new formulas for the wing-lift-curve slope, for both the compressible and incompressible cases, are derived in this report. In addition, several illustrative examples of resultant tail loads due to different conditions of flight are given for both the old and new formulas of lift-curve slope. The examples include both the incompressible and and compressible cases. (Author)

10. FUELS AND COMBUSTION

AD-411 911 Div. 10
(TISTM/TCG) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
AN IMPROVED METHOD FOR THE MEASUREMENT OF SOLID-PROPELLANT STRAND-BURNING RATES IN CLOSED BOMBS,
by D. H. Stewart and E. L. Moon. 10p.
NAVWEPS 8070; NOTS TP3076
Unclassified report

Descriptors: (*Propellant grains, Burning rate), (*Burning rate, Measurement), (*Solid rocket propellant, Propellant grain), Wire, Timing devices, Pressure, Time, Propellants, Test methods, Surface area.

A new method for determining propelland strand-burning rates without the use of timing wires has been developed. It was found that when the cross-sectional area of the strand is sharply varied at known intervals, the burning rate can be obtained from assessment of the resulting pressure-time trace. Results of the new method are within 1% of the standard wire technique. The method is applicable to ''difficult'' propellant systems and offers advantages of lower cost, higher reliability, and safety. (Author)

AD-411 926 Div. 10
(TISTM/AMS) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
THE ROLE OF ALUMINUM AND ITS OXIDES IN SOLID PROPELLANTS.
Quarterly status rept. no. 3, 1 Jan-31 Mar 63,
by G. Neil Spokes. Apr 63, 15p.
Proj. PAU 4134
Unclassified report

Descriptors: (*Aluminum compounds, Oxides), (*Solid rocket propellants, Aluminum), Theory, Thermionic emission, Test equipment, Photoelectric effect, Exhaust gases, Ionization, Attenuation, Work functions, Single crystals, Electron density, Crystals, Mathematical analysis, Mathematical models, Microwaves.

A brief review of the literature suggests that the work function of solid aluminum oxide may have values of 3.5 eV or more depending on temperature and impurity levels. Pure Al2O3 single crystals may have a work function in excess of 6.5 eV. The significance of these values is discussed briefly. A previously neglected correction has been made to our theory of electron emission by insulators. The electron density in equilibrium with pure alumina particles consequently may be very much smaller than previously estimated. Progress on radar attenuation studies of particle-laden flames has been limited owing to the destructive effects of a detonation in our burner system. New experiments are under way. Photoelectric emission has been induced in alpha-alumina particles by 1849A mercury line radiation. The significance of this is discussed. (Author)

AD-412 442 Div. 10, 12, 16
(TISTB/MD) OTS price $2.00

Aerojet-General Corp., Azusa, Calif.
TOXIC HAZARDS EVALUATION OF TITAN II TEST FIRINGS: METHODS AND RESULTS OF LABORATORY AND FIELD INVESTIGATIONS.
Rept. for Apr 62-Jan 63,
by R. Wetherington, D. A. Nole, H. Roby, M. Y. Longley, and M. Kennebeck, Jr. June 63, 70p. Rept. no. 2552
Contract AF33 616 7836, Proj. 6302, Task 630205
AMRL TDR63 52 Unclassified report

Report on Toxic Hazards of Propellants and Materials.

Descriptors: (*Rocket motors (Liquid propellant), Hazards), (*Exhaust gases, Determination), Guided missile personnel, Nitrogen compounds, Dioxides, Atmospheric pollution, Tetroxides, Gas analysis, Chromatographic analysis, Coolants, Chemical analysis, Soils, Carbon dioxide, Carbon monoxide indicators, Cyanides, Grasses, Vegetables, Hydrazines, Hydrazine derivatives, Infrared spectrophotometers, Mass spectroscopy, Samplers, Meteorological phenomena, Experimental data, Guided missiles (Surface-to-surface), Hypergolic rocket propellants, Test facilities, Test methods, Captive tests, Contamination, Toxicity.

Toxicologically significant environmental contaminants near Titan II test-stand facilities were studied, with specially developed field and laboratory techniques, primarily to determine the degree of hazard associated with exhaust constituents. For exhaust products that were identified and quantitatively evaluated, it was found that normal test firings create no significant personnel hazard in test areas and that, with proper treatment procedures, no significant water-pollution problems are created. A method for determining Titan II test-firing contributions to a community-air-pollution situation was also developed.

AD-413 833 Div. 10, 17
(TISTM/REB) OTS price $1.60

Phillips Petroleum Co., Bartlesville, Okla.
GAS TURBINE AND JET ENGINE FUELS.
Progress rept. no. 1,
by W. L. Streets. 5 Aug 63, 11p. Rept. no. 3559 63R
Contract NOw63 0406d
Unclassified report

Descriptors: (*Jet engine fuels, Corrosion), (*Gas turbines, Corrosion), Guide vanes, Sea water, Heat-resistant metals and alloys, Sulfur, Sulfur compounds, Materials.

Twelve-hour metal loss tests on the combined effects of fuel sulfur and ingested sea water (so-called ''black plague'' corrosion conditions) on turbine inlet guide vanes have been completed. Five typical superalloys including Udimet 500, Waspalloy, Haynes Alloy 25, Hastelloy R-234 and Rene' 41 were evaluated. An essentially sulfur-free base fuel consisting of 75 wt-% JP-5 boiling range isoparaffins plus 25 wt-% cumene was contaminated with 1 wt-% sulfur (as ditertiary butyl disulfide). Time was available for only a single comparative test (Udimet 500) on the isoparaffinic fuel with 1 per cent sulfur but no aromatic added. The results obtained show that (1) from the single set of comparative test results available the presence of 25% (max. specification limit) aromatics in the base fuel had no detrimental effect on metal durability at 2000 F; (2) ingestion of sea salt at the level of 15 ppm of the total mass throughput to the combustor (a rate realistic, for example, for helicopters hovering just above the ocean surface) dramat-

ically increased metal loss rates for all the alloys above the rates observed during operation on a 1% sulfur fuel without sea salt ingestion. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-411 826 Div. 11, 26
(TISTE/JWS) OTS price $3.60

SKF Industries, Inc., Philadelphia, Pa.
A STUDY OF ELASTIC VIBRATIONS OF THE OUTER RACE OF A ROLLING ELEMENT BEARING.
Special rept.,
by Ronald L. Huston. 29 Aug 61, 1v.
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on Study of the Vibration Characteristics of Bearings.

Descriptors: (*Ball bearings, Vibration), (*Vibration, Ball bearings), Mathematical models, Resonance, Differential equations, Velocity, Load distribution, Loading (Mechanics), Frequency.

Elastic flexural vibrations of a thin ring (the outer race of a ball bearing) are investigated analytically using mathematical principles common in the theory of mechanical vibrations. The analysis is performed by first deriving a governing differential equation. Exact and approximate solutions of this equation are then presented for various geometrical configurations such as a free circular ring, a circular ring on a linear radial elastic foundation, a circular ring rigidly supported at a number of equally spaced points, and a circular ring supported by a number of equally spaced identical linear springs (simulating the conditions in a bearing). A brief discussion of forced vibrations is also included. Finally, a numerical example is outlined for a deep groove ball bearing. Mathematical solutions were found for the natural frequencies of the flexural vibrations in ring configurations representing simplified models of ball bearing rings in thrust loaded bearings. A ring with multiple elastic supports has a sequence of natural frequencies not being integral multiples of a fundamental frequency and dependent on ring mass and on the elastic properties of ring and supports. The magnitude of the lowest natural frequency was found to range from less than 1 KC to 5 KC on a few bearing sizes of the 6200 and 6300 series evaluated numerically. At least 2 natural frequencies and up to 7-10 exist in the range below 10 KC. (Author)

AD-412 314 Div. 11, 20
(TISTE/JWS) OTS price $6.60

Mitre Corp., Bedford, Mass.
THE FEASIBILITY OF A RADIATION PROTECTED COMMUNICATIONS REPAIR VEHICLE,
by T. W. Schwenke, N. J. Donnelly, W. W. Hicks and B. A. Frances. 15 Jan 62, 1v. Rept. no. SR39
Contract AF33 600 39852, Proj. 600 6
ESD TDR63 382 Unclassified report

Descriptors: (*Maintenance vehicles, Radioactive fallout), (*Radioactive fallout, Maintenance vehicles), Feasibility studies, Dose rate, Whole body irradiation, Radiation effects, Shielding, Communication equipment, Nuclear explosion damage, Shelters.

The results of an initial study of the feasibility of a radiation protected communications repair vehicle. Chapter 1 introduces the communications repair problem and states the structure of the study. Chapter 2 contains an analysis of the major communications repair problems for which a communications repair vehicle must be designed. The following items are discussed: (1) the nature of the damage likely to occur during and after a nuclear attack, (2) the fallout environment in which the repair crew must make repairs, and (3) the tolerance of human beings to nuclear radiation. Chapter 3 describes the three different types of repair vehicles that are proposed: the first vehicle shelters a two-man crew only while transporting the crew to and from repair points, the second vehicle shelters a larger crew only while transporting the crew to and from repair points for team relay work on longer repair jobs, and the third vehicle shelters a two-man crew during both travel and actual repair work. The results of the sheltering calculations for these three vehicles are presented. Chapter 4 contains a brief analysis of the capabilities of the repair vehicles, and the conclusions and recommendations concerning these radiation protected repair vehicles are presented in the final chapter. (Author)

AD-412 591 Div. 11
(TISTE/CAM) OTS price $2.60

Army Transportation Research Command, Fort Eustis, Va.
TEST OF WHEEL ADAPTERS FOR THE OFF-ROAD WHEEL AND TIRE CONVERSION KIT.
Engineering rept.,
by Jack DeJong. June 63, 19p.
House task 4.24
ARTRECOM Technical rept. 63 33
Unclassified report

Descriptors: (*Adapters, Modification kits), (*Vehicle wheels, Modification kits), (*Tires, Modification kits), Tracked vehicles, Trailers, Roadwheels, Loading (Mechanics), Terrain, Test methods, Instrumentation.

Presented is all testing performed on the wheel adapter, a component of the Off-Road Wheel and Tire Conversion Kit. The kit permits a tractor-semitrailer to be equipped with 14.75 X 20 desert tires in lieu of the 11.00 X 20 standard military highway tires. The tests of the wheel adapter, as part of the kit's evaluation, were carried out to fulfill a requirement for improved off-road mobility of TC vehicles. Tests were conducted in four phases: (1) X-ray analysis of the material, (2) static load tests, (3) dynamic load tests, and (4) magnaflux inspection of casting. Tests were conducted at Fort Eustis, Virginia, and Camp Wallace, Virginia. Inspection and analysis of the wheel adapters indicated a sound material free of defects. No failures occurred during any of the static or dynamic loadings. It is concluded that the wheel adapters are of more than sufficient strength to permit a tractor-semitrailer to be fitted with desert tires. (Author)

AD-413 285 Div. 11, 12
(TISTA/GEC) OTS price $9.10

Boeing Co., Seattle, Wash.
FUNCTIONAL ACCEPTANCE TEST PROCEDURES TRANSPORTER ERECTOR,
by V. Khvoroff. 26 Jan 62, 1v. Document no. D2 5617, Vol. 2
Contract AF04 647 580
Unclassified report

Descriptors: (*Transporter-erectors, Acceptability), Performance (Engineering), Tractors, Trailers, Military requirements, Specifications, Test methods, Guided missiles (Surface-to-surface).

Procedures are established for functional acceptance testing of the following operational end item equipment: Track Tractor, transporter erector A/S 32A-14; Semitrailer, transporter erector A/M 32A-44; Panel, control erector; and Transporter erector assembly. (Author)

AD-413 436 Div. 11, 12
(TISTA/GEC) OTS price $5.60

Boeing Co., Seattle, Wash.
FATIGUE AND STATIC ULTIMATE LOAD TEST PROGRAM - TRANSPORTER-ERECTOR,
by Donald G. Probe. 19 Mar 63, 1v. Document no. D2 13497
Contract AF04 647 289
Unclassified report

Descriptors: (*Transporter-erectors, Tests), Fatigue (Mechanics), Loading (Mechanics), Guided missiles (Surface to surface), Captive tests, Test methods.

Test plans are described for fatigue and ultimate tests of the Transporter-Erector (-E) as specified in CCN 302 (BSD -62 MSN-2358). The test program will consist of two phases as described below: fatigue test at 1.2 times of the T-E requires 1.2 times normal operating loads through 10,000 cycles; and ultimate static test requires at critical altimate design loads to be applied to destruction during the condition considered to be the most critical. (Author)

12. GUIDED MISSILES

AD-411 798 Div. 12, 1
(TISTA/LSK) OTS price $8.10

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-112-1-11 AND QUALIFICATION SUPPLEMENT I THEREOF, SEAT, OPERATORS,
by G. C. Harrison. 10 Jan 63, 1v. D2 9945 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Aircraft seats, Test methods), Launching sites, Test equipment, Specifications, Military requirements, Guided missiles (Surface to surface), Checkout equipment, Captive tests, Environmental tests, Command and Control systems.

This qualification document, which is associated with the respective basic specification and qualification supplement, covers the qualification test procedures and reports for the Seat, Operators, TYPE FN 128/GSW-4. Also covered is the certification on full compliance with the qualification requirements of the foresaid supplement. Due to similarity of design, the Seat Operators, TYPE FN 127/GSW-4 will qualify based on this qualification. (Author)

AD-411 828 Div. 12
(TISTP/AW) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION (S-133-121-3-1-2) AND QUALIFICATION SUPPLEMENT I THEREOF, EXPLOSIVE SET CIRCUITRY TEST SET,
by B. R. Consineau. 15 Apr 63, 13p. Rept. no. D2 12643 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Test sets, Guided missiles (Surface to surface)), (*Circuit testers, Guided missiles (Surface to surface)), Circuits, Interference, Specifications, Charges (Explosive).

AD-411 879 Div. 12, 26
(TISTP/JEA) OTS price $5.60

Boeing Co., Seattle, Wash.
FLIGHT TEST MISSILE 435, MODEL SPECIFICATION S-133-1007C.
Acceptance summary report,
by Carl J. Lesh. 26 June 63, 1v. D2 10889 1 vol. 52
Contract AF04 647 289
Unclassified report

Descriptors: (*Quality control, Guided missile components), (*Specifications, Quality control), Maintenance, Acceptability, Ground support equipment, Indexes, Identification, Guided missiles (Surface-to-surface).

This data identifies and describes the actual status of end items, designated for first article customer inspection or team acceptance review. It includes any waivers or deviations that exist or are required for non-conformance items. Status reporting will be at the delivery level unless otherwise noted. Responsibility of maintenance to include base commitments is transferred to the base quality control planning unit receiving the equipment. The purpose is to establish a composite status for use by base personnel to determine status of equipment received, and to serve as a record of first article end item acceptance as required by BSD-STL and AFQC at Seattle for delivery to base installations. (Author)

AD-411 940 Div. 12
(TISTA/GEC) OTS price $28.50

Boeing Co., Seattle, Wash.
CTLI INSTRUMENTATION FLIGHT PROOF TEST REPORT, (INTERIM CONFIGURATION) (MRCN 6301),
by E. Belin. 14 Sep 62, 1v. Test no. T2 2443
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Payloads), (*Payloads, Instrumentation), Tests, Reliability, Training devices, Launching, Environmental tests, Airborne.

One Airborne CTLI Section 39, S/N 0000003, was subjected to Pre-production Flight Proof Tests. These tests were made to demonstrate Reliability, Accuracy and Performance of the CTLI System under environmental conditions which will be encountered during launch and power flight, and/or handling, shipping, and storage to the test site area. (Author)

AD-411 941 Div. 12, 6
(TISTE/JWS) OTS price $26.00

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST OF THE CTLI WAFER (MRCN 6301),

by D. P. Jones and A. F. Day, Sr. 14 Sep 62, 1v.
Test no. T2 2932
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Radiofrequency interference), (*Radiofrequency interference, Guided missile components), (*Guided missile components, Radiofrequency interference), Measurement, Radio transmitters, Radio receivers, Tests, Test equipment (Electronics), Tables, Data.

An outline of the test performed on the CTLI Instrumentation Section (Wafer) and the test results are presented. Pass or fail is determined by: (1) whether the test sample meets the specification limit requirements of GM 07-59-2617A for Conducted Generation, Radiated Generation and Antenna Conducted-Transmitter Key down tests, and (2) whether the test sample meets the specification requirements of D2-12411, Vol. II for the monitored critical parameters for all susceptibility tests. (Author)

AD-411 954 Div. 12, 8
(TISTA/FRL) OTS price $4.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-112-1-52, AND QUALIFICATION SUPPLEMENT I THEREOF, ARRESTER PANEL ASSEMBLY,
by C. L. Waby. 25 Feb 63, 45p. Document no. D2 14202 2
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Antenna feeds), Antenna components, Tests, Quality control, Environmental tests, Shock (Mechanics), Vibration, Humidity, Temperature.

The qualification report, which is associated with the respective basic specification (S-133-112-1-52, D2-14202) and qualification supplement (D2-14202-1), covers the qualification testing of the Arrester Panel Assembly, hereinafter termed ''APA''. Also covered is the certification of compliance with the qualification supplement. (Author)

AD-411 997 Div. 12
(TISTA/GEC) OTS price $2.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
SATELLITE TESTING PROCEDURES INCLUDING ENVIRONMENTAL CONDITIONS FOR PAYLOAD EQUIPMENT AND ASSEMBLED PAYLOADS,
by M. A. Schreiber. May 63 rev., 23p. Rept. no. TG416B
Contract NOw62 0604

Unclassified report

Supersedes TG-416A.

Descriptors: (*Satellites (Artificial), environmental tests), Payloads, Electronic equipment, Test methods, Vibration, Acceleration, Rocket motors (Solid propellant), Simulation, Combustion, Launch vehicles (Aerospace).

This document establishes the procedure and environment to be used in satellite electronic equipment and assembled payload testing. These tests are formulated specifically to establish the ability of the equipment to withstand, without performance degradation, storage, handling, transportation, pre-launching preparations, launching, orbital injection and sustained orbit. (Author)

AD-412 288 Div. 12
(TISTA/LSK) OTS price $3.60

Rand Corp., Santa Monica, Calif.
VALIDATING MAINTENANCE POLICIES AND ESTIMATING LAUNCH CAPABILITY FOR BALLISTIC MISSILES,
by Milton Kamins. July 63, 29p. RM3645PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Maintenance, Scheduling), (*Guided missiles (Surface-to-surface), Maintenance), Checkout procedures, Checkout equipment, Test methods, Reliability, Mathematical analysis, Operations research.

This Memorandum is part of a long-term study of maintenance policies and their effect on Air Force capabilities and costs. Using a methodology developed at RAND some time ago, (AD-247 383) this Memorandum suggests a means of maximizing the readiness posture of the ICBM force. The procedure suggested can be used to determine the appropriate frequency for a variety of scheduled maintenance activities on systems (particularly large missiles) that are normally inert and are not verified by a regular flying program. The methodology should be of considerable interest and use to persons responsible for specifying scheduled maintenance requirements for nearly all unmanned weapon systems, whether under the responsibility of support (AFLC and AFSC) or operating commands, and whether in the development, acquisition, or operational phase. (Author)

AD-412 360 Div. 12
(TISTA/GEC) OTS price $1.10

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR CONDUIT SUPPORT SET, RACEWAY (S-133-100[illegible]-1-7, MRCN 6005 - WING I),
by G. B. Gillespie. 5 Feb 63, 4p. Document no. D2 12296 3
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Electric cables), (*Electric cables, Supports), Acceptability.

This qualification test report covers the testing performed to qualify the Conduit Support Set, Raceway, for use on the Minuteman missile. (Author)

AD-412 394 Div. 12, 30
(TISTM/AMS) OTS price $2.60

System Development Corp., Santa Monica, Calif.
'INDIAN OCEAN STATION' BUFFER (IOSB). MILESTONE 5 OPERATING INSTRUCTIONS,
by Pat Nelson and R. C. Wise. 9 July 63, 24p. Rept. no. TM1245 002 00
Contract AF19 628 1648

Unclassified report

Descriptors: (*Programming (Computers), Satellite networks), (*Satellite networks, Programming (Computers)), Telemetering data, Tapes, Preparation, Operation, Instruction manuals.

This document reports that the group of operational programs contained on the IOS Buffer Master tape has essentially two purposes; the preparation of a prepass/preflight paper tape for a station, and the processing of a telemetry paper tape from a station. (Author)

AD-412 490 Div. 12
(TISTP/HSS) OTS price $2.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR WING II MISSILES 618 - 633,
by R. L. Dramer. 2 May 63, 22p. D2 13947 1
Contract AF04 694 46

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Production), Weight, Sealing compounds, Configuration, Guided missile components.

AD-412 491 Div. 12, 26
(TISTP/AW) OTS price $21.00

Boeing Co., Seattle, Wash.
WS-133A. GRAPHIC ILLUSTRATION. OPERATION AND MAINTENANCE RECORDS - MTAFB.
by Ronald W. Roos. 18 Mar 63, 349p. Document no. D2 14942
Contract AF04 694 107

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface). Maintenance). Guided missile components, Time, Reliability, Life expectancy, Data, Reliability (Electronics).

AD-412 494 Div. 12
(TISTA/LSK) OTS price $6.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT - FTM 432 MODEL SPECIFICATION S-133-1000-0-1,
by Robert J. Hemmestad. 1 July 63, 1v. Document no. D2 3929 432
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface). Acceptability). Guided missile components, Tables, Specifications, Indexes, Flight testing.

The purpose of D2-3929 is to document an Acceptance Summary Report for Flight Test Missiles as required to support final acceptance activities at the Boeing Test Site. This document contains the following: (1) waivers and deviations granted by Air Force Ballistic System Division/Space Technology Laboratories (AFBSD/STL); (2) contractor certification forms; (3) part shortage items; and (4) equipment identification forms. (Author)

AD-412 509 Div. 12
(TISTA/GEC) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT, GUIDED MISSILE BODY SECTION - INTERSTAGE 1-2,
by E. A. Hughes. 10 Jan 63, 10p. Doc. no. D2 12291 3
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Airframes), Staging, Acceptability, Separation.

This qualification test report covers the testing performed to qualify the Guided Missile Body Section (Interstage 1-2), to model specification S-133-1000-1-2. Certification of full compliance with the qualification requirements is included. (Author)

AD-412 512 Div. 12
(TISTA/GEC) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT. GUIDED MISSILE BODY SECTION - INTERSTAGE 2-3,
by E. A. Hughes. 10 Jan 63, 10p. Doc. no. D2 12292 3
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface). Airframes). Staging, Acceptability, Separation.

This qualification test report covers the testing performed to qualify the Guided Missile Body Section (Interstage 2-3) to model specification S-133-1000-1-3. Certification of full compliance with the qualification requirements is included. (Author)

AD-412 513 Div. 12
(TISTA/GEC) OTS price $1.10

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-112-1-10 AND QUALIFICATION SUPPLEMENT I THEREOF, SEAT, OPERATORS,
by G. C. Harrison. 10 Jan 63, 4p. Doc. no. D2 9946 2
Contract AF04 647 580

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Ground support equipment), Operators (Personnel), Seats, Launching sites, Command and control systems, Aircraft seals.

Certification of qualification is established of the Launch Control Facility Operator Seat, Type FN-127/GSW-4. (Author)

AD-412 519 Div. 12, 27
(TISTA/GEC) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-121-1-4 AND QUALIFICATION SUPPLEMENT I THEREOF, CARRIAGE, ROCKET MOTOR 1ST STAGE,
by C. E. Shaw. 14 Feb 63, 9p. Document no. D2 7229 2
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Booster motors), (*Booster motors, Ground support equipment), Specifications, Military requirements, Supports, Rocket motors (Solid propellant).

This qualification report covers the qualification testing of the 1st Stage Rocket Motor Carriage of the Minuteman missile. (Author)

AD-412 521 Div. 12, 27
(TISTA/GEC) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-121-1-8 AND QUALIFICATION SUPPLEMENT I THEREOF, CARRIAGE, ROCKET MOTOR, THIRD STAGE,
by C. E. Shaw. 14 Feb 63, 10p. Document no. D2 7231 2
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Third stage motors), (*Third stage motors, Ground support equipment), Specifications, Military requirements, Supports, Rocket motors (Solid propellant), Sustainer motors.

This qualification report covers the qualification testing of the Third Stage Rocket Motor Carriage for the Minuteman missile. (Author)

AD-412 640 Div. 12, 30
(TISTP/WH) OTS price $11.00

Hercules Powder Co., Bacchus, Utah.
HERCULES POWDER COMPANY FLIGHT DATA HANDLING AND ANALYSIS PLAN. WEAPON SYSTEM 133A, ROCKET MOTOR M-57, MINUTEMAN STAGE III,
by Paul L. Howard. July 63, 141p. MTO198 44
Contract AF04 647 243
Unclassified report

Descriptors: (*Data processing systems, Telemetering data), Guided missiles (Surface to surface), Tracking, Pulse modulation, Frequency modulation, Digital systems, Magnetic tape, Instrumentation, Rocket motors, Digital computers.

The purpose of this plan is to define the methods utilized in reducing and analyzing flight test data. Included are the sources and methods of handling the raw data, the means for converting the raw data to usable engineering information, the procedures used in data reduction and the procedures used in the analysis of the reduced flight test data. A detailed procedure is presented for the quick-look analysis accomplished by the HPC AMR Field Test Office for input to the TWG Field Test Report, and the analysis accomplished by HPC, Bacchus, Utah for the final Flight Test Evaluation Report. This plan is presented in a form which is conductive to amendments as new and/or revised objectives and procedures are utilized. This plan provides ready reference to the handling and analysis techniques applicable to the present Flight Tes Program at AMR and furthermore the format will serve as a basis for future flight test objectives. (Author)

AD-412 660 Div. 12, 8
(TISTP/WH) OTS price $19.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
C&C SUBSYSTEM ENGINEERING ANALYSIS REPORT GEMINI AGENA TARGET VEHICLE.
19 July 63, 1v. Rept. no. SP63 11
Contract AF04 695 129
Unclassified report

Descriptors: (*Rendevous vehicles, Design), (*Launch vehicles, Design), Communication systems, Control systems, Ultrahigh frequency, Pulse communication systems, Digital systems, Antennas.

This engineering analysis report presents the problems, constraints, and solutions in the design of the Communication and Control (C&C) Subsystem for the Gemini Agena Target Vehicle. The Subsystem requirements are developed from the mission objectives and requirements. (Author)

AD-412 717 Div. 12
(TISTA/GEC) OTS price $6.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FTM - 425,
by Robert J. Hemmestad. 7 Mar 63, 1v. D2 3929 425
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Acceptability), Specifications, Military requirements, Catalogs, Quality control, Research program administration.

This document contains the following: Waivers and Deviations granted by Air Force Ballistic System Division/Space Technology Laboratories against the requirements of Model Specifications S-133-1000-0-1 for this missile; Certification by Boeing Engineering and Quality Control that the Missile Assembly complies with the requirements of the applicable specification and/or top drawing; and Certification by Autonetics, Thiokol Chemical Corporation, Aerojet General Corporation and Hercules Powder Company, of compliance with applicable specifications and/or top drawing; A list of part shortages for the Missile and a list incomplete items traveled to the Launch Area; and Identify by Equipment Model and/or Drawing Number of the Missile Configuration. (Author)

AD-412 842 Div. 12
(TISTP/HSS) OTS price $1.10

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
TRILATERAL TRIANGULATION,
by Robert E. Green. June 63, 9p.
AERDA 42 Unclassified report

Descriptors: (*Guided missile ranges, Instrumentation), (*Position finding, Mathematical prediction), Vector analysis, Target position indicators, Guided missile tracking systems.

A method is presented for computing Cartesian position from line-of-sight measurements from three noncollinear sites. The method is a special application of trilateration. (Author)

AD-412 884 Div. 12
(TISTA/LSK) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE OPTIMALITY OF MULTISTAGE ROCKETS,
by O. F. Makarov. 14 June 63, 13p.
FTD TT63 427 Unclassified report

Trans. from Russian Periodical, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya ''Aviatsionnaya Tekhnika, Nr. 4, pp. 18-26, 1962.

Descriptors: (*Guided missiles, Dynamics), Gravity, Staging, Motion, Mathematical analysis, optimization, Celestial mechanics, Theory, Perturbation theory, Rockets.

AD-412 956 Div. 12
(TISTA/LSK) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHYSICAL PRINCIPLES OF ROCKET FLIGHT,
by A. A. Dmitriyevskiy and V. N. Koshevoy.
21 June 63, 89p.
FTD TT63 345 Unclassified report

Descriptors: (*Guided missiles, Research program administration), (*Rocket motors, Research program administration), Spin-stabilized ammunition, Guided missiles (Surface to surface), Guided missiles (Surface to air), Dynamics, Rocket propulsion, Rocket motors (Solid propellant), Rocket motors (Liquid propellant), Rocket motor nozzles, Guided missile trajectories, Aerodynamic characteristics.

Contents:
The Physical Laws that Serve as The Basis for the Theory of Reaction Motion
Thrust of Jet Engine
Rocket Flight
Flight Features of Various Types of Rockets

AD-412 959 Div. 12
(TISTA/GEC) OTS price $1.10

Aeronutronic, Newport Beach, Calif.
RELIABILITY SUMMARY REPORT, PENETRATION AIDS DEVELOPMENT.
July 63, 8p.
Contract AF04 694 23
Unclassified report

Descriptors: (*Reentry vehicles, Penetration), Guided missiles (Surface to surface), Reliability, Failure (Mechanics), Malfunctions, Nose cones.

AD-413 045 Div. 12
(TISTA/GEC) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ROCKET FLIGHT INTO SPACE,
by I. A. Merkulov. 4 June 63, 91p.
FTD TT63 315 Unclassified report

Descriptors: (*Astronautics, Space flight), Nuclear propulsion, Satellites (Artificial), Spacecraft, Rocket propulsion, Jet propulsion, Launch vehicles (Aerospace), Staging.

Contents:
At the threshold of flights into outer space
A grandiose scientific objective
The jet-propulsion engine
Nuclear energy in rocket technology
Rockets
Rocket trains
Tsiolkovskiy's Ethereal Island
Rocket flights
Design of artificial satellites
Itineraries and periods of flights into outer space
Space ships
First in the world

AD-413 061 Div. 12
(TISTA/LSK) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINING EPHERMERIDES OF MAN-MADE EARTH SATELLITES AT POINT OF RAPPROCHEMENT,
by Ya. E. Eynasto and S. A. Kutusov. 14 June 63, 13p.
FTD TT63 545 Unclassified report

Trans. from Byulleten' Stantsiy Opticheskogo Nablyudeniya Iskusstvennykh Sputnikov Zemli, No. 10, pp. 12-23, 1960.

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Mathematical prediction), Equations, Mathematical analysis, Position finding.

AD-413 063 Div. 12
(TISTA/GEC) OTS price $7.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR WING II MISSILES 712-737,
by R. L. Dramer. 31 July 63, 71p. Document no. D2 13947 4
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Weight), Guided missile components.

This document contains the actual sealant weight and balance summary for Wing II missiles, the weight effect of all changes incorporated at Plant 77 not reported in D2-13946-X, and a configuration page for each missile included in this report. (Author)

AD-413 066 Div. 12, 5
(TISTP/PCR) OTS price $4.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN).
25 June 63, 1v. Rept. no. MPO SR11 5 400, Rev. 1
Contract AF04 694 261
Unclassified report

Descriptors: (*Telephone communication systems, Launching sites), (*Data transmission systems, Launching sites), (*Command and control systems, Strategic Air Command), Cables (Mechanical), Design, Guided missiles (Surface-to-surface), Strategic weapons, Communication systems, Communication equipment, Circuits, Noise, Ranges (Distance), Hardening, Digital systems.

This report presents the transmission design criteria for the voice and data networks of the Minuteman Ground Electronics System (GES) as recommended by Sylvania for WS-133B. The transmission criteria for the following networks are included in this document: (1) Maintenance Communications Network (MCN); (2) Hardened Voice Channel (HVC); (3) Primary Alert System (PAS); (4) Emergency War Order Primary System (EWO-1); (5) Emergency War Order Secondary System (EWO-2); (6) SAC Digital Data Communications (465-L); (7) Command and Status Data System (C&S); and (8) Launch Enable System (LES). (Author)

AD-413 070 Div. 12, 17, 25
(TISTP/FEM) OTS price $6.60

RAND Corp., Santa Monica, Calif.
REVIEW OF PHYSICAL PROCESSES IN HYPERVELOCITY IMPACT AND PENETRATION,
by Robert L. Bjork. July 63, 51p. Rept. no. RM3529PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Hypervelocity projectiles, Penetration), (*Impact shock, Metals), Meteorites, Satellites (Artificial), Vulnerability, Experimental data, Steel, Aluminum, Flat plate models, Sheets, Cratering, Melting, Velocity, Temperature, Density, Particle size.

Research was conducted on hypervelocity impact. Applications of the results were made to the problems of the meteoroid hazard, satellite vulnerability, and ICBM defense. Some new information in this area is reported and some of the earlier work is compared with recent experimental data. (Author)

Division 12 - GUIDED MISSILES

AD-413 083 Div. 12, 8, 22
(TISTP/RHR) OTS price $5.60

Air Force Missile Test Center, Patrick Air Force Base, Fla.
THE AMR ACCURACY PROBLEM,
by George K. Hess, Jr. and Charles E. Pearce.
5 Dec 62, 51p.
AFMTC TDR63 2 Unclassified report

Descriptors: (*Guided missile tracking systems, Calibration), (*Guided missile ranges, Guided missile tracking systems), (*Guided missile computers, Calibration), (*Guided missile launchers, Electronic recording systems), (*Guided missile trajectories, Calibration), Trajectories, Electronic scanners, Instrumentation, Data processing systems, Radar tracking, Optical equipment, Design, Ships, Aircraft, Tracking, Phase measurement.

The need to evaluate and improve the accuracy of trajectory measurements are subjects requiring continued theoretical and experimental attention. The paper identifies this situation as the AMR accuracy problem. It is written in three parts. Part one introduces the subject of accuracy; part two provides a detailed analysis of trajectory measurements, the instrumentation, the environment, the data reduction, and the problems encountered in eliminating errors; part three is a summary of the problem and includes recommendations for theoretical and experimental work. (Author)

AD-413 142 Div. 12
(TISTP/JEA) OTS price $1.10

Boeing Co., Seattle, Wash.
GUIDED MISSILE BODY SECTION (STAGE I SKIRT).
Qualification test rept.,
by E. A. Hughes. 9 Jan 63, 9p. Document no. D2 12290 3
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile (Surface-to-surface), Airframe), (*Airframe, Structural properties), Reliability, Tests, Environmental test, Aerodynamic loading, Acceptability.

The testing performed to qualify the guided missile body section (Stage I Skirt), is presented. Certification of full compliance with the qualification requirements is included. (Author)

AD-413 147 Div. 12
(TISTP/AW) OTS price $5.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF SIX REPAIR PROCEDURES FOR THE XM5 HAWK GUIDED MISSILE SYSTEM WARHEAD,
by Leon J. Vojnik and Max E. Guzeko. Mar 63, 1v.
AGPA Technical rept. 3073
Unclassified report

Descriptors: (*Guided missile warheads, Maintenance), (*Guided missiles (Surface-to-air), Maintenance), Sealing compounds, Arming devices, Water, Guided missile components, Bonding, Coatings, Plastic coatings, Seals (Stoppers), Locking fastener devices, Sprays, Watertight fittings, Plastic seals.

Studies were conducted to develop repair procedures to correct six problems which arose during deployment of XM5 Hawk Guided Missile System warheads at various field installations. The six problems were: (1) Water leaking into the safety and arming (S&A) cavity and S&A device receptacle wells, (2) loose discs in the S&A liner seat, (3) loose S&A device mounting inserts, (4) loose warhead mounting inserts, (5) cracked warhead mounting lugs, and (6) cracked S&A liners. (Author)

AD-413 279 Div. 12
(TISTP/JEA) OTS price $1.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MISSILE 63 038 (539),
by C. A. Hannon. 4 Dec 62, 8p. Document no. D2 13945 539
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missile components, Weight), (*Weight, Guided missile components), Guided missiles (Surface-to-surface), Seals (Stoppers), Corrections.

AD-413 284 Div. 12, 23
(TISTW/PCR) OTS price $33.50

Boeing Co., Seattle, Wash.
SECTION IV, POSITION DEFINITIONS QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION FOR WS-133A MINUTEMAN HARDENED AND DISPERSED.
21 Apr 61, 1v. Document no. D2 5859, vol. 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile personnel, Job analysis), Specifications, Guided missiles (Surface-to-surface), Strategic weapons, Launching sites, Silos, Military personnel.

This document contains a statement of the general features of each position type recommended for the MINUTEMAN H&D System plus duty and task statements for each position. (Author)

AD-413 286 Div. 12, 13
(TISTW/PCR) OTS price $10.50

Boeing Co., Seattle, Wash.
SPECIFICATIONS FOR WS-133A - LAUNCH CONTROL FACILITY - HF/UHF ANTENNA BRICK AND MORTAR FACILITY.
by E. C. Arnaldo. 15 June 62, 1v. Document no. D2 14121
Contract AF04 647 289
Unclassified report

Descriptors: (*Launching sites, Specifications), Military requirements, Control systems, Guided missile (Surface to surface), Strategic weapons, Construction, Guided missile antennas, High frequency, Ultrahigh frequency, Brick, Concrete, Pipes, Steel, Structures, Sheets, Paints, Finishes and finishing, Electrical equipment, Soil mechanics.

Specifications are presented for the WS-133A - launch control facility - HF/UHF antenna brick and mortar facility. Technical provisions are the following: clearing and grubbing, earthwork, excavation, trenching, filling, and back filling; pipe culverts, concrete, structural steel and miscellaneous metals, sheet metalwork, (General), protective painting and finishing, bituminous prime coat, fencing, gates, electrical work, soil sterilization. (Author)

AD-413 287 Div. 12
(TISTW/PCR) OTS price $6.60

Boeing Co., Seattle, Wash.
WS-133A SAFETY ANALYSES REPORTS. VOLUME V. OPERATIONAL GROUND EQUIPMENT,
10 Nov 61, 1v. Document no. D2 12298, Vol. 5
Contract AF04 647 289
Unclassified report

Descriptors: (*Ground support equipment, Guided missiles (Surface to surface), Strategic weapons, Guided missile safety, Launching sites, Guided missile launchers, Suspension devices, Guidance, Control systems, Cooling and ventilating equipment, Storage batteries, Display systems, Control panels, Power supplies.

Each major item or subassembly of the MINUTEMAN Weapon System will be analyzed for Safety. The compilation of the Safety Analysis reports will be in this document. Separate volumes will be used to compile analyses in all major categories. This volume reports on Operational Ground Equipment. (Author)

AD-413 322 Div. 12
(TISTW/PCR) OTS price $19.75

Boeing Co., Seattle, Wash.
TEST REPORT, INSTRUMENTATION FLIGHT PROOF TEST (CTLI) - (10-20885-1 C/D RECEIVER CONFIG.),
by J. Farrell. 9 Apr 63, 1v. Document no. T2 2541
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Tests), Impact shock, Vibration, Destructors, Humidity, Temperature, Guided missiles (Surface-to-surface), Strategic weapons.

This document contains the test report of the Flight Proof Test of the MRCN 6301 Minuteman WS-133A CTLI configuration using the 10-20885 specification Command-Destruct receivers. This configuration is representative of a number of flight wafer, MRCN 6301, numbered above 0000017. Only equipment which was not qualified in previous Flight Proof Testing was installed and operated during this test. All other equipment was size and mass simulated. The Flight Proof Test consisted of the following tests: Drop Test (Unpackaged), Vibration Test (Non-Operation), Flight Vibration Test (Operating). The Flight Proof Test Program is intended to assure and demonstrate system design capability of the Boeing assembled CTLI System preparatory to flight tests. The program is intended to demonstrate both reliability and accuracy of performance of the CTLI System under laboratory produced environmental conditions simulating environments expected during shipping to the test site, and during handling, storage, testing and flight. (Author)

AD-413 406 Div. 12, 27
(TISTA/GEC) OTS price $2.60

Naval Weapons Lab., Dahlgren, Va.
PRESSURE MEASUREMENTS IN THE SUPERSONIC REGION OF THE TERRIer guided missile booster, mark 12 MOD 0 (X-240) EXHAUST STREAM,
by J. J. Walsh, Jr. 6 Aug 63, 19p.
NWL Rept. no. 1874 Unclassified report

Descriptors: (*Guided missiles (Surface to air), Exhaust gases), Base flow, Blast, Pressure, Stagnation point, Supersonic flow, Captive tests, Guided missile launchers, Experimental data, Booster motors, Rocket motors (Solid propellant), Hazards.

Measurements of stagnation pressure were made in the supersonic region of the exhaust stream of the TERRIER Guided Missile Booster MARK 12 MOD 0 (X-240). Forty static booster firings were utilized in obtaining the measurements. The results of the pressure measurements are given in tabular form and in contour plots extending to an axial distance of twenty-nine feet downstream of the nozzle exit. (Author)

AD-413 422 Div. 12
(TISTM/AMS) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THE OPERATIONAL READINESS OF A SYSTEM SUBJECT TO A MIXED MAINTENANCE POLICY,
by N. Kaufman. 12 July 63, 23p.
Contract AF04 694 3
BSD TDR63 140 Unclassified report

Descriptors: (*Maintenance, Mathematical models), (*Mathematical models, Maintenance), Operation, Reliability, Equations, Mathematical analysis, Inertial guidance.

This report presents a model of a system subject to a mixed maintanance policy and derives equations which can be used to produce a numerical value for the availability of such a system. An example of a system subject to such a mixed maintenance policy is the Inertial Guidance System of the Atlas Weapon, which is monitored continuously at a given test level and checked out periodically at a higher test level. In addition, a discussion of the data requirements necessary to estimate the parameters of the model is presented. (Author)

AD-413 435 Div. 12
(TISTW/PCR) OTS price $8.60

Boeing Co., Seattle, Wash.
WS-133A SAFETY ANALYSES REPORTS. VOLUME III. MISSILE-BORNE EQUIPMENT.
21 Mar 62, 1v. Document no. D2 12298, Vol 3
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile safety, Guided missiles (Surface to surface), Strategic weapons, Cables (Mechanical), Training devices, Test equipment, Test sets, Timing devices, Arming devices, Electrolytes, Guided missile batteries, Guided missile components, Tests.

Each major item or subassembly of the MINUTEMAN Weapon System will be analyzed for Safety. The compilation of the Safety Analysis reports will be in this document. Separate volumes will be used to compile analyses in the major categories: This volume reports on Missile-Borne Equipment. (Author)

AD-413 437 Div. 12
(TISTP/AW) OTS price $8.10

Boeing Co., Seattle, Wash.
MODEL SPECIFICATION - R&D PROTOTYPES FOR WING

II MISSILES, S-133-1000-0-1
by J. H. Adams and D. D. Brewer. 7 Sep 62, 1v.
Document no. D2 14286 1
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Specifications), Instrumentation, Telemetering transmitters, Guided missile components, Rocket motors (Solid propellant), Reentry vehicles, Inertial guidance, Inertial navigation, Staging, Destructors, Strategic weapons.

Test requirements for verification of prototype XSM-80B missile design under the flight testing provisions of the WS-133A Research and Development Program were established. Airborne System Requirements - Model Specification S-133-1000-0-1 (D2-14286) covers only the production end-item, Guided Missile Main Assemblage, delivered less G&C Section and R/V from Air Force Plant 77. This specification (S-133-1000-0-1, D2-14286-1) correlates the planned variations in Wing II R&D flight missile configuration by identification of the Associate Contractor model specifications for major sections of the missile and its operating subsystems. Operating Conditions - Test Directives issued in accordance with the WS-133A General Test Plan will establish the requirements for ground tests utilizing the XSM-80B missile, and for missile performance and range capability demonstrations to be fired from underground launchers at existing test sites near sea-level. (Author)

AD-413 440 Div. 12, 22
(TISTW/PCR) OTS price $8.60

Boeing Co., Seattle, Wash.
MINUTEMAN STANDARD OPERATING PROCEDURE ORDNANCE DEVICES,
by R. G. Caley. 17 Oct 60, 1v. Document no. D2 9133
Contract AF04 647 289
Unclassified report

Descriptors: (*Arming devices, Guided missiles (Surface to surface)), Strategic weapons, Safety devices, Rocket motors (Solid propellant), Booster motors, Second stage motors, Third stage motors, Ignition, Destructors, Detonators, Staging, Test methods, Guidance, Control systems, Explosives initiators.

The purpose of this document is to provide a single index for all step by step standard operating procedures dealing with installation, test, and removal of Minuteman Ordnance devices. This document will index all step by step standard operating procedures for functional testing, installation, removal of Minuteman Ordnance devices and handling of malfunctions. This will include Associate Contractor as well as Boeing developed procedures. Associate Contractor procedures and now Boeing procedures will be added as they become available. (Author)

AD-413 514 Div. 12, 9
(TISTA/GEC) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
APPROXIMATE CALCULATION OF RF ATTENUATION FOR A LIFTING RE-ENTRY VEHICLE,
by F. A. Vicente. 11 June 63, 33p. Rept. no. TDR169 3116 40TN2
Contract AF04 695 169
SSD TDR63 112
Unclassified report

Descriptors: (*Reentry vehicles, Radio frequency interference), (*Wedges, Radio-frequency interference), Attenuation, Lift, Boost glide vehicles, Gas ionization, Shock waves, Plasma sheaths, Reaction kinetics, Mathematical model, Boundary layer, Numerical analysis.

The effect of ionized air on electromagnetic waves is investigated to compare some crude predictions with some experimental data and to offer a possible solution to the communications blackout problem with re-entry vehicles. The author restricts himself to the normal shock and far-field calculations in order to show that a fairly good approximation can be obtained from a rather simple-minded approach to a flow field analysis. A drastic reduction in RF signal attenuation is shown to be possible by reducing the wedge angle and increasing the sharpness of the nose. The consequent approach suggested is to design the transmitter housing in the shape of a thin wedge with a sharp leading edge. The housing would be mounted in a forward direction on a control surface of a lifting re-entry vehicle (or, if necessary, on an extension to the control fin) so that it protrudes through the vehicle shock layer. (Author)

AD-413 546 Div. 12
(TISTP(W)/PCR) OTS price $8.10

Boeing Co., Seattle, Wash.
SITE ACCEPTANCE TEST PROCEDURES LAUNCH CONTROL FACILITY, MAFB,
by D. J. Berard. 30 Aug 61, 1v. Doument no. D2 9262
Contract AF04 647 714
Unclassified report

Descriptors: (*Launching sites, Control systems), Test methods, Guided missiles (Surface-to-surface), Strategic weapons, Cables (Mechanical), Power supplies, Control panels, Data processing systems, Radio equipment, Antennas, Strategic Air Command, Checkout procedures, Ground support equipment, Radio communication systems.

The purpose of Volume III of D2-9265 is to present the procedures for accepance testing required to assure the proper operation of the equipment within a Launch Control Facility. The scope of volume III consists of procedures for tests involving just those equipment which are assembled within the Launch Control Facility. Section 1 of this volume presents abstracts of the Operation Ground Equipment End-item test procedures for acceptance tests to be conducted at the Launch Control Facility. The abstracts consist of the following information: (1) Description of the equipment. (2) Prior test requirements. (3) Reference to the Post-assembly test procedures document. (4) A general description of the Post-Assembly End-Item Test. Section 2 of this volume presents the detail step-by-step procedures for the integration testing of the Operational Ground Equipment within the Launch Control Facility. (Author)

AD-413 547 Div. 12
(TISTP/AW) OTS price $7.60

Boeing Co., Seattle, Wash.
SITE ACCEPTANCE TEST PROCEDURES STRATEGIC MISSILE SUPPORT BASE -MAFB,
by R. E. Chamberlain. 15 Jan 62, 37p. Document no. D2 9262 V6
Contract AF04 647 714
Unclassified report

Descriptors: (*Checkout procedures, Launching sites), Checkout equipment, Guided missiles (Surface-to-surface), Ground support equipment, Maintenance, Quality control, Military requirements.

Functional test procedures for the checkout of and for the subsequent operation of the Strategic Missile Support Base (SMSB) at a WS-133A H&D operational base are presented. The scope of Volume VI consists of the checkout of the assembled equipment in the SMSB which is used for the checkout of equipment processed through the SMSB for assembly or utilization at a launch facility of launch control facility. (Author)

AD-413 548 Div. 12
(TISTW/PCR) OTS price $1.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MISSILE 63-054 (562), by R. L. Dramer. 11 Jan 63, 10p. Document no. D2 13945 562
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Weight), Strategic weapons, Configuration, Sealing compounds, Tables.

This document presents the Air Force Plant 77 flight article mass properties report of Boeing responsibility components assembled at Plant 77 for Minuteman Missile 63-054 (562). It contains the actual mass properties of the Boeing components after assembly, a summary of all sealant added to the missile, and a list of the serial numbers of all major components of the missile. (Author)

AD-413 549 Div. 12
(TISTP/PCR) OTS price $1.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MISSILE 63-059(563), by R. L. Dramer. 14 Jan 63, 10p. Document no. D2 13945 563
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Weight), Strategic weapons, Configuration, Sealing compounds, Tables.

This document presents the Air Force Plant 77 flight article mass properties report of Boeing responsibility components assembled at Plant 77 for Minuteman Missile 63-059 (563). It contains the actual mass properties of the Boeing components after assembly, a summary of all sealant added to the missile, and a list of the serial numbers of all major components of the missile. (Author)

AD-413 550 Div. 12, 26, 23
(TISTP/JEA) OTS price $8.60

Boeing Co., Seattle, Wash.
AMR MINUTEMAN SAFETY REQUIREMENTS, by J. E. Montagne. 10 Apr 61, 1v. Document no. D2 3892
Unclassified report

Descriptors: (*Guided missile safety, Military requirements), (*Guided missile ranges, Guided missile safety), Guided missile personnel, Hazards, Launching sites, Quality control, Monitors, Safety, Guided missiles (Surface to surface), Solid rocket propellants, Checkout procedures.

AD-413 551 Div. 12, 26
(TISTP/PCR) OTS price $12.50

Boeing Co., Seattle, Wash.
VAFB ACCEPTANCE/DEMONSTRATION PROGRAM PLAN, by G. B. Webb. 16 Apr 62, 1v. Document no. D2 13302
Contract AF04 647 757
Unclassified report

Descriptors: (*Launching sites, Guided missils (Surface-to-surface)), Strategic weapons, Training, Military training, Management engineering, Procurement, Research program administration, Checkout procedures, Test methods, Military requirements, Specifications, Strategic air command, Air Force systems command.

The purpose of this document is to define the tasks, data, delivery, and procedures required to accomplish the Acceptance and Delivery/Turnover activities for the Minuteman facilities at Vandenberg Air Force Base (VAFB) in accordance with the approved AFBSD Exhibit 61-65. The document applies to the WS-133A sites and training facilities being activated by the Integrating Contractor (Boeing). With Air Force concurrence, through approval of the Air Force Contracting Officer, this document identifies all the requirements for Acceptance of the Assembly and Checkout task, identifies the requirements for demonstration and subsequent Delivery/Turnover of the facilities at VAFB, and satisfies the requirements of AFBSD Exhibit 61-65. Completion of the requirements set forth in this document is evidence of compliance with the model specifications S-133-110 (VAFB Addendum), S-133-111 (VAFB Addendum), S-133-112 (VAFB Addendum), S-133-120)VAFB Addendum), S-133-2110, and D2-9911. (Author)

AD-413 577 Div. 12
(TISTM/AM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SELECTING THE RELATIVE VALUE OF A CRITICAL CROSS-SECTION OF A NOZZLE OF A LIQUID ROCKET ENGINE CHAMBER,
by O. I. Kudrin. 18 June 63, 13p.
FTD TT63 417 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika, No. 3, pp. 78-88, 1958.

Descriptors: (*Rocket motor nozzles, Design), (*Rocket motors (Liquid propellant), Rocket motor nozzles), Equations, Pressure, Combustion chambers, Dynamics.

AD-413 596 Div. 12
(TISTA/LSK) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LAUNCHING FROM ORBIT - THIS IS ....,
by N. Varvarov. 6 June 63, 8p.
FTD TT63 489 Unclassified report

Trans. from Tekhnika-Molodezhi, No. 3, pp. 6-7, 1963.

Descriptors: (*Venus probes, Launching). (*Launching, Orbital trajectories), Space stations.

AD-413 610 Div. 12
(TISTP/FEM) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE. PHASE III.
Monthly progress rept. no. 17, 1-31 May 63,
by L. W. Ricketts. 31 May 63, 2p.
Contract DA11 022ORD4048
Unclassified report

Descriptors: (*Arming devices, Guided missile warheads), (*Solid state physics, Switching circuits), Design, Safety, Circuits, Semiconductors devices, Time switches, Electronic equipment.

The design, development and fabrication of three minature electronic Solid State Arm Safe Devices capable of functioning in various warheads for Army missiles under a wide range of environmental conditions is reported. The first outputs must activate a squib at a preselected acceleration. The second output is to have a Solid State switching circuit which will provide an electrical change of state after the missile has traveled a preselected distance from the launch site. (Author)

AD-413 656 Div. 12
(TISTP/AW) OTS price $1.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR WING I MISSILES 731 AND 745,
by R. L. Dramer. 7 Aug 63, 11p. Rept. no. D2 13945 731
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Maintenance), Sealing compounds, Weight, Physical properties, Gravity.

The nominal sealant weight and balance summary for Wing I missiles is reported. The weight effect of all changes incorporated at Plant 77 not reported in D2 13944 XXX and a configuration page for each missile included in this report are listed. (Author)

AD-413 815 Div. 12
(TISTW/PCR) OTS price $2.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
NOTES ON TESTS OF INSERTS USED IN HAWK WARHEAD XM5E3,
by Richard E. Crater and John J. Debiec. July 63, 25p.
DA Proj. 57 71 3605
PA Technical memo. no. 1171
Unclassified report

Descriptors: (*Guided missile warheads, Guided missiles (Surface-to-air)), Guided missile components, Low altitude, Torque, Fracture (Mechanics), Plastics, Arming devices, Design, Safety devices.

Torque tests were made on threaded inserts of the HAWK Warhead, XM5E3 because of reported problems from loose inserts and cracks in the plastics, and loose inserts in the S & A liner and warhead mounting lugs. An improved method of holding the inserts in the plastic resulted from these tests. Production changes were made incorporating these new design features. (Author)

AD-413 866 Div. 12
(TISTE/CAM) OTS price $3.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-111-1-46, AND QUALIFICATION SUPPLEMENT I THEREOF, ARRESTER, ELECTRICAL SURGE (SECURITY SYSTEM),
by R. P. Carlton. 16 Jan 63, 39p. D2 13175 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Lightning arresters, Transients), (*Electric arcs, Lightning arresters), Electric discharges, Test methods, Specifications.

AD-413 872 Div. 12, 9.
(TISTA/GEC) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
WIND-TUNNEL TESTS ON A WINGLESS MISSILE WITH SYMMETRICAL BLOWING SIDE JETS (FLUID WINGS) AT MACH NUMBERS OF 2.16, 2.48, AND 2.85,
by C. Carl Brindle. June 63, 1v.
DTMB Rept. no. AERO1055 Unclassified report

Descriptors: (*Guided missiles, Jets), (*Jets, Wings), Model tests, Wind tunnel models, Aerodynamic configurations, Pitch (Motion), Ogives, Cylindrical bodies, Schlieren photography, Supersonic characteristics, Stability, Experimental data, Drag.

Results are presented of a wind-tunnel investigation of symmetrical blowing from the sides of a wingless missile body (Fluid Wings). The tests were conducted at Mach numbers of 2.16, 2.48, and 2.85. The effects of various slot locations and supply pressures for the fluid wing upon the longitudinal characteristics of the missile are indicated. The increase in the operational Mach number range of winged guided missiles is seriously affected by the limitations of the lifting and control surfaces. These conventional surfaces become a source of high wave drag and present difficult structural and aerodynamic heating problems at high speeds. Some of these high-speed problems could be minimized by the use of a wingless missile with jet blowing, in lieu of the conventional surfaces, to control the missile during flight. (Author)

AD-413 898 Div. 12, 7, 13
(TISTP/JEA) OTS price $7.60

Boeing Co., Seattle, Wash.
LAUNCH FACILITIES SYSTEM -- MANUAL - FIXED INSTALLED SUPPORT EQUIPMENT -- POWER GENERATION AND DISTRIBUTION -- MALMSTROM AFB.
1 July 62, 1v. D2 13608 2, vol. 1
Contract AF04 647 580
Unclassified report

Descriptors: (*Ground support equipment, Instruction manuals), (*Power supplies, Launching sites), Electric power production, Generators, Diesel engines, Distribution, Control system, Checkout procedures, Guided missiles (Surface to surface).

This manual is one of a set of four manuals providing detailed information for operation and maintenance of launch facilities fixed installed support equipment systems of the WS133A weapon system installed at Malmstrom Air Force Base. (Author)

AD-413 931 Div. 12
(TISTW/PCR) OTS price $21.00

Boeing Co., Seattle, Wash.
MINUTEMAN MONTHLY FAILURE SUMMARIES - JULY, 1963.
16 Aug 63, 1v. Document no. D2 5286 42
Contracts AF04 694 107 and AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Failure (Mechanics)), Strategic weapons, Operation, Checkout procedures, Factories.

The failure data from each area are first tabulated to show the numbers of discrete failure events at the Figure A equipment level to provide quick visibility regarding trend as well as a breakdown of the data with respect to types and causes of failures. Back-up pages are then provided to describe each reported failure event reflected in the tabulations. These descriptions are also intended to relate the number of specific Figure A components replaced to restore the Figure A to satisfactory operating condition. The failures classified as Primary Failure Events are related to equipment unreliability and are subject to corrective action by means of design changes. Hardware failures caused by faulty instructions or personnel errors are classified as ''controllable''since they can be controlled by management actions. In total, all of the failure data pertinent to replaceable-level components are useful for logistics purposes. A separate section of the report, Section I, provides a summary of hardware and system problems evidenced by the failure data received from all bases, together with the status of resolution of each problem. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-411 783 Div. 13
(TISTE/JWS) OTS price $6.60

Fritz Engineering Lab., Lehigh U., Bethlehem, Pa.
INELASTIC BUCKLING OF STEEL FRAMES,
Le-Wu Lu. June 63, 62p. Rept. no. 276 7
Contract Nonr610 03
Unclassified report

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Buckling (Mechanics), Structural shells), Numerical analysis, Loading (Mechanics), Elasticity, Plasticity, Welds, Beams (Structural), Structural properties, Curve fitting, Failure (Mechanics), Tables, Moments.

A numerical method for the determination of the sidesway buckling strength of partially yielded steel frames is presented. The method is illustrated with reference to the simple rectangular frame. Extension of the procedure to other types of frames is possible so long as the applied loads and the frame geometry are symmetrical and if failure is characterized by sidesway buckling in the plane of the frames. It is believed that the proposed method may also be adapted to the study of the dynamic response of elastic-plastic structures, when the effect of axial force is of considerable importance. (Author)

AD-411 786 Div. 13
(TISTE/WA) OTS price $11.00

De Leuw, Cather and Co., Chicago, Ill.
DEEP EXCAVATION TECHNIQUES FOR SHELTERS IN URBAN AREAS. PRELIMINARY PLANNING AND COST DATA.
July 63, 97p.
Contract DA49 129ENG507
Unclassified report

Descriptors: (*Shelters, Construction), (*Underground structures, Shelters), Design, Costs, Urban areas, Drainage, Site selection, Geological survey, Civil engineering.

The studies presented are designed to illustrate, in a broad sense, application of appropriate techniques of excavation to general subsurface conditions which occur in the continental United States. Specific subsurface conditions for open cut excavations and general parameters of conditions for tunnel excavations are established to provide a practicable range of study results. These conditions are analyzed individually, with respect to the type and geometry of the excavation, for evaluation of an effective and economical technique of excavation, and from that evaluation the determination of related cost factors. Summation of these cost factors and further analysis is presented. The results of review of the general field of excavation techniques as pertains to this report are also presented. These include description and evaluation of techniques, utilizing materials and equipment in common and special usage and proved to be of economic value, techniques under development which would be appropriate for consideration, and undeveloped techniques which might be considered promising with respect to excavations contemplated. (Author)

AD-411 808 Div. 13, 25
(TISTE/OHD) OTS price $2.60

Rand Corp., Santa Monica, Calif.
MINIMUM-WEIGHT DESIGN FOR MOVING LOADS,
by Oliver A. Gross and William Prager. Jan 62, 16p. RM2887PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Beams (Structural), Design), Weight, Flanges, Web beams, Load distribution, Linear programming, Mathematical analysis, Mathematical models.

The main problem considered and solved is the minimum-weight design of a horizontal I-beam of constant web and variable flange thickness. The beam is simply supported at one end and built in at the other and is designed to withstand (in plastic flow) a concentrated vertical load of fixed intensity moving slowly from one end to the other. To introduce the general techniques employed, a few discrete versions of the problem are first presented and solved as linear-programming problems. (Author)

AD-412 342 Div. 13
(TISTB/JAB) OTS price $11.50

American Inst. for Research, Pittsburgh, Pa.
PLANNING GUIDES FOR DUAL-PURPOSE SHELTERS,
by Robert W. Smith and Mary Ann Lasky.
31 July 63, 148p. Rept. no. C93 9 63TR
Contract OCD OS62 104
Unclassified report

Descriptors: (*Shelters, Radioactive fallout), Civil defense systems, Radiological contamination, Decontamination, Ventilation, Air, Purification, Water Supplies, Food dispensing, Lighting equipment, Santary engineering, Disposal.

This document provides general planning information relative to the principal factors which must be considered in the development of group fallout shelter facilities. It discusses a number of possible methods for dealing with each factor. Emphasis is placed upon the potential dual-purpose use of facilities usually available within existing structures. The information which is provided is designed to permit the shelter planner to select specific methods for meeting each shelter requirement according to the needs and opportunities dictated by his particular situation. The planning areas discussed in the report include: radiological protection, other weapon effects, temperature and atmosphere control, water supply, food, lighting, fire protection, medical, sanitation, communications, sleeping facilities, warning and shelter entry, and organization and management. (Author)

AD-412 428 Div. 13
(TISTE/WA) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
CONSTRUCTION PROBLEMS WITH PILOT SANITARY SYSTEM AT POINT BARROW,
by W. R. Nehlsen. 24 June 63, 24p.
Task Y F015 11 194
NCEL TN 512 Unclassified report

Descriptors: (*Sanitary engineering, Polar regions), Design, Construction, Sewage, Sea water, Drainage, Heating, Civil engineering.

A pilot sanitary system was designed to serve five family quarters buildings at the Arctic Research Laboratory at Point Barrow, but construction problems and system failures have thus far prevented use of the system. The design included sea water intakes, a distillation unit and distilled water distribution system, and a sea water sanitary sewer system. Problems encountered include insulation failures caused by ground water, pipe breakage resulting from faulty joints and heating wires, and pipe freezing. (Author)

AD-412 633 Div. 13, 14
(TISTM/TCG) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
PRELIMINARY INVESTIGATION OF FLUID DISTRIBUTION SYSTEMS FOR TEMPORARY POLAR CAMPS,
by W. R. Nehlsen. 28 June 63, 8p.
Navy Proj. Y F015 11 194
NCEL TN516 Unclassified report

Descriptors: (*Polar regions, Sanitary engineering), (*Sanitary engineering, Polar regions), (*Water supplies, Civil engineering), (*Fluids, Distribution), Steam, Steam pipes, Sewage, Fuels, Design, Materials, Glass textiles, Foams, Isocyanate plastics, Polyethylene plastics, Copper, Iron alloys.

Fluid distribution and collection lines for polar camps are expensive and unsatisfactory. Detailed investigation of means of improving conventional designs is recommended, including study of limited use of synthetic pipe materials, testing of existing designs and equipment, and development of a leak detector. In addition, radical redesign using unconventional materials is recommended as the best approach to a greatly improved system for future use. (Author)

AD-413 416 Div. 13
(TISTB/MS) OTS price $11.50

MRD Div., General American Transportation Corp., Niles, Ill.
ENVIRONMENTAL CONTROL SYSTEMS FOR CLOSED UNDERGROUND SHELTERS,
by T. R. Charanian, A. J. Glueckert, R. G. Barile and J. D. Zeff. Apr 63, 141p. Rept. MR 1190 50
Contract OCD OS62 56, Proj. 1107
Unclassified report

Descriptors: (*Shelters, Radioactive fallout), (*Engineering, Shelters), Closed-cycle ecological systems, Control systems, Ventilation, Oxygen, Carbon dioxide, Odors, Gases, Temperature control, Humidity, Chemical warfare agents, Costs, Safety, Human engineering.

The project entailed the investigation and cost analyses of atmosphere control techniques for use in closed underground fallout shelters. Internally located, self-contained environmental control systems are required for shelter atmosphere control whenever the presence of nearby outside fires precludes the supply of outside air to the shelter. Environmental control systems which were evaluated included all conceivable types of oxygen supply, carbon dioxide and toxic constituent removal, and temperature and humidity control. The project was divided into four principal categories as follows: (1) study of man's physiological environmental requirements, (2) engineering evaluation and analysis of all conceivable systems, (3) experimental investigations of candidate systems, (4) application study for selection of the appropriate system for particular shelter types. (Author)

AD-414 093 Div. 13
(TISTB/WA) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
GRAVITY VENTILATION OF PROTECTIVE SHELTERS,
by Earl J. Beck, Jr. 8 July 63, 12p.
Proj. Y F011 05 340
NCEL TN N 471 Unclassified report

Descriptors: (*Shelters, Ventilation), Design, Gravity, Exhaust systems, Flames, Thermoelectricity.

The obvious alternate to a power operated ventilation system for a protective shelter is natural draft. The possibilities, limitations and some alternates for simple augmentation of natural draft are outlined. These include the use of a flame in a flue, both with and without thermoelectric power generation. A simple design procedure and demonstration test program are outlined. (Author)

14. MATERIALS (NON-METALLIC)

AD-411 780 Div. 14, 17, 1, 30
(TISTM/EJH) OTS price $9.10

Vertol Div., Boeing Co., Morton, Pa.
HELICOPTER ROTOR BLADE EROSION PROTECTIVE

MATERIALS, PHASE I.
Rept. for 1 July-15 Oct 62.
Dec 62, 90p. R296
Contract DA44 177TC836, Task 1D121401A14169
TCREC TR62 111 Unclassified report

Descriptors: (*Rotor blades (Rotary wings), Erosion), Deserts, Helicopter rotors, Environmental tests, Sand, Raindrops, Stainless steel, Polyvinyl chloride, Isocyanate plastics, Synthetic rubber, Plastics, Nickel alloys, Nickel, Molybdenum, Alloys, Metals, Materials, Films, Tapes.

The most erosion resistant materials in each of the 4 categories studied were: electroformed nickel - BV 43 (metal), polyurethane BV 123 (nonmetal film), neoprene BV 197 (nonmetal liquid), and polyvinyl chloride BV 221 (nonmetal pressure sensitive tape). All of these except the polyvinyl chloride showed adequate resistance to rain erosion. Based on erosion test performance, dimensional uniformity, aerodynamic contour control, system simplicity, ease of application and availability, the polyurethane film (BV 123) is considered to be the most promising material tested. In general, the best nonmetals were more sand erosion resistant than the best metals. The complexity of the mechanism of flat panel sand erosion was indicated by the success attained with resilient materials (polyurethanes and neoprenes) and very hard materials (silicon carbide deposited on graphite). This is further supported by the different erosion patterns at the nose and flank of whirling-arm specimens of different materials. (Author)

AD-411 802 Div. 14, 31
(TISTM/EJH) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
MECHANISM OF WATER ABSORPTION IN GLASS-REINFORCED PLASTICS,
Quarterly rept. no. 4, 1 Apr-28 June 63,
by D. W. McNeil, Bailey Bennett, and R. I. Leininger. 28 June 63, 16p.
Contract NObs86871, Proj. SR007 03 04
Task 1008
Unclassified report

Descriptors: (*Filament wound construction, Water), (*Glass textiles, Water), (*Polymers, Water), Absorption, Mechanical properties, Diffusion, Hydrostatic pressure, Cylindrical bodies, Epoxy plastics, High pressure research.

Experiments with hydrophilic polymers as models demonstrate that the diffusion rate of water into these materials is not perceptibly accelerated by increasing the hydrostatic pressure of the immersion studies at atmospheric and elevated pressure. Mechanical properties accompanies prolonged immersion.

AD-411 813 Div. 14, 25
(TISTM/BRW) OTS price $9.10

Southern Research Inst., Birmingham, Ala.
EVALUATION OF TENSILE DATA FOR BRITTLE MATERIALS OBTAINED WITH GAS BEARING CONCENTRICITY.
Final rept. 1 Jan-31 Dec 62,
by C. D. Pears. May 63, 92p.
Contract AF33 657 7685, Proj. 7350, Task 735003
ASD TDR63 245 Unclassified report

Report on Refractory Inorganic Nonmetallic Materials.

Descriptors: (*Brittleness, Tensile properties), (*Test equipment, Gas bearings), Ceramic materials, Graphite, Aluminum compounds, Oxides, Surface properties, Volume, Deformation, Loading (Mechanics), Velocity, Fracture (Mechanics), Temperature, Statistical analysis, Theory, Experimental data.

Using gas bearings to provide uniaxial loading, the ultimate tensile strengths of an alumina and a graphite were investigated statistically at 70, 1000 and 1600 F and the strengths correlated with volume, surface finish and strain rate. Significant correlations were found for the parameters at most levels. (Author)

AD-411 838 Div. 14
(TISTM/TCG) OTS price $.50

Rock Island Arsenal Lab., Ill.
MULTIMETAL COATING PROCESS FOR COMPOSITE STEEL, MAGNESIUM, AND ALUMINUM STRUCTURES,
by Jodie Doss. 16 May 63, 18p.
Proj. 1HO 24401A110
RIA Rept. no. 63 1651
Unclassified report

Descriptors: (*Composite materials, Coatings), (*Steel, Coatings), (*Magnesium, Coatings), (*Aluminum coatings), Structures, Processing, Tin coatings, Phosphate coatings, Corrosion.

Aluminum, steel and magnesium trimetal assemblies were simultaneously coated in order to decrease galvanic corrosion and to develop coatings to be used for recoating structurally united components containing dissimilar metals. The following experimental solutions were utilized to coat trimetal assemblies: stannate-chromate, phosphate, stannate-gluconate, stannate-hypophosphate, and stannous pyrophosphate. The stannous pyrophosphate solution produced the best coatings on the assemblies. (Author)

AD-411 845 Div. 14, 4
(TISTM/TCG) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
ACCELERATED DETERIORATION OF ELASTOMERS.
Quarterly progress rept., no. 4, 1 May-31 July 63,
by Frank R. Mayo, Kurt Egger, Jorge Heller, R. L. Walrath and Katherine Crawford Irwin. 31 July 63, 16p.
Contract DA18 108cm17216A, Proj. PMU4204
Unclassified report

Descriptors: (*Elastomers, Degradation), (*Polymers, Oxidation), (*Organic compounds, Elastomers), Cobalt compounds, Catalysts, Reaction kinetics, Hydrazine derivatives, Synthetis rubber, Amines, Heterocydis compounds.

The object of this research is to find ways to degrade elastomers rapidly at or near room temperature. We are therefore studying the effects of soluble metal salts, hydrazines, and thiols on the rates of oxidation and chain scission of polyisoprene and polybutadiene in chlorobenzene as solvent. A number of complex cobalt compounds have been compared in oxidations of polyisoprene. A combination of t-butyl hydroperoxide and a cobaltous compound has given an immediate high rate of oxidation of undergraded rubber. At high extents of oxidation, cobaltic compounds are precipitated. In the fast reaction between phenylhydrazine, polyisoprene, and oxygen, two molecules of oxygen are consumed per molecule of phenylhydrazine. A combination of phynylhydrazine and cobaltous acetylacetonate gives an effect intermediate between the fast but limited action

of the hydrazine and the slower but long-sustained action of the metal. Experiments on the p-thiocresol-initiated oxidation of polyisoprene show that low concentrations of this reagent produce the quickest degradation, but that higher concentrations produce larger effects after considerable delay. (Author)

AD-411 [illegible]5 Div. 14
(TISTM JH) OTS price $13.00

Pratt and Whitney Aircraft, East Hartford, Conn.
INVESTIGATION OF MAGNETOHYDRODYNAMIC POWER GENERATION. VOLUME IV -- MATERIALS.
Dec 62, 1v. 2125
Contract AF30 602 2487, Proj. 5561, Task 556101
RADC TR62 464, vol. 4 Unclassified report

Descriptors: (*Magnetohydrodynamics, Power supplies), (*Power supplies, Magnetohydrodynamics), (*Refractory materials, Power supplies) Electrodes, Electric insulation, Electrical conductance, Resistance (Electrical), Thermal expansion, Compatibility, Bibliographies, Beryllium compounds, Magnesium compounds, Strontium compounds, Calcium compounds, Zirconates, Oxides.

This report presents the results of an investigation of materials for use in an MHD generator operating at wall temperatures in the range of 3000 to 4500 F. The investigation consists of a systematic evaluation of promising materials selected after an extensive literature survey. The program, which includes high-temperature laboratory measurements of material properties and the characteristic material performance under environmental operating conditions, was designed to select the best materials for this high temperature MHD application. The results presented include the experimental determination of electrical resistivity, thermal expansion, and strength of several refractory conductors and insulators. The results of chemical compatibility tests and the environmental testing program are also included. In addition, data is presented from an investigation of tensile strength and tensile modulus of selected material. (Author)

AD-411 929 Div. 14, 15
(TISTM/TCG) OTS price $2.60

Watervliet Arsenal, N. Y.
ALPHA CLASSIFICATION OF MICROFIBERS. PART III.
by M. A. Sadowsky and M. A. Hussain. Apr 63, 28p.
DA Proj. 59332007
WVT RP6307 Unclassified report

Descriptors: (*Fibers, Mathematical analysis), (*Elasticity, Fibers), (*Composite materials, Mathematical models), Stresses.

The delta-ring has been put through the acceptance test with fiber characteristic (stiffness exponent) equal to 2, and a linear inextensible, limp flexible fiber has been formed in the result. (Author)

AD-412 336 Div. 14, 17
(TISTM/REB) OTS price $4.60

Southern Research Inst., Birmingham, Ala.
THE DEVELOPMENT OF HEAT-RESISTANT PAINTS FOR METALS.
Final rept., 28 May 62-28 Feb 63.
15 Mar 63, 42p.
Contract NOw62 0727d
Unclassified report

Descriptors: (*Metals, Paints), (*Paints, Heat resistant materials), Zinc compounds, Oxides, Hydrogen compounds, Phosphites, Silicon compounds, Methanes, Dioxides, Coatings, Corrosion inhibition.

Studies were made to develop a protective paint that could be cured at a low temperature to produce a heat-resistant and corrosion-resistant coating on metals. A paint-consisting of a mixture of zinc oxide, dimethyl hydrogen phosphite, and an aqueous dispersion of colloidal silica-was developed that cures at normal temperatures to consistently produce coatings that are hard, well bonded, and resistant to heat, water, thermal shock, corrosion by salt spray, weathering, and many common chemicals. The availability of moisture from the environment during the early stages of curing is critical in obtaining the desired properties; the requirements have been defined. Other paint systems that were investigated during the studies included combinations of: zinc oxide, dimethyl hydrogen phosphite, and ethyl acid phosphate; zinc oxide and dimethyl hydrogen phosphite with hydrated silica and alumina; zinc oxide with di-n-butylamine phosphate; lithia and beryllia with organo-phosphorus compounds; dimethyl hydrogen phosphite with boron glass frits containing oxides of magnesium, zinc, barium, and phosphorus; and zinc oxide and dimethyl hydrogen phosphite with several refractory-metal powders. (Author)

AD-412 339 Div. 14
(TISTM/AMS) OTS price $3.60

Illinois U., Urbana.
EFFECT OF RESIN PROPERTIES ON THE FRACTURE OF FRP LAMINATE MODELS,
by John William Melvin. July 63. 14p. Rept. no. 249
Contract Nonr294702, NRL Proj. 62R05 19A
Unclassified report

Descriptors: (*Epoxy plastics, Filament wound construction), Composite materials), Embedding substances, Laminates, Glass textiles, Fracture (Mechanics), Mathematical analysis, Equations, Dynamics, Loading (Mechanics), Load distribution, Stresses, Shear stresses, Models (Simulation).

This paper is concerned with the effect of the flexibility of epoxy resin on the fracture of a model of a FRP laminate. The design of a model using glass rods to represent glass fibers is described, a mathematical analysis of the loads in individual rods is presented and the results of tensile tests of the model are discussed. The average ultimate strength of the models using the flexible resin was found to be 32% higher than the models using the stiff normal resin. The flexible resin models also exhibited a markedly different mode of fracture. Recommendations are made as to the merits of using flexible resins in FRP laminates. (Author)

AD-412 353 Div. 14, 25
(TISTM/BRW) OTS price $2.75

Little, Arthur D., Inc., Cambridge, Mass.
THERMODYNAMIC AND KINETIC STUDIES FOR A REFRACTORY MATERIALS PROGRAM,
ed. by L. A. McClaine. May 63, 132p.
Contract AF33 616 7472, Proj. 7350, Task 735001
ASD TDR62 204, pt. 2 Unclassified report

Descriptors: (*Refractory materials, Thermodynamics), (*Oxidation, Reaction kinetics), Borides, Carbides, Oxides, Hafnium compounds, Zirconium compounds, Molybdenum, Low pressure research, High temperature research, Specific heat, Electrical conductance, Transport properties, Calorimeters, Electron diffraction analysis, Mass spectroscopy, Thermochemistry, Heat of formation, Phase studies, Diffusion, Vapor pressure, Fluorination.

Thermodynamic and kinetic data which are required to describe the chemical behavior of the zirconium and hafnium carbides and borides at temperatures to 3000K and in atmospheres of O2, O2 + H2O, Cl2, HF, F2, H2, CO, NH3, and N2 are presented. Preparation of high purity ZrC, ZrO2, HfB2, and HfC are described. Experimental low temperature heat capacity data for ZrC and heat content data for ZrB2 from 410 to 1126K are presented. Current status of calorimetric, electron diffraction, equilibria, and spectroscopy studies are reported. (Author)

AD-412 407 Div. 14
(TISTM/TCG) TS price $2.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
WATER VAPOR TRANSMISSION OF CONCRETE AND OF AGGREGATES.
30 June 63, 70p.
NCEL TRR244
Unclassified report

Descriptors: (*Concrete, Water vapor), (*Water vapor, Transport properties), Compressive properties, Sodium compounds, Chlorides, Ceramic material, Reinforced concrete, Steel, Particle size, Humidity, Reinforcing materials, Aliphatic compounds, Carboxylic acids, Cements.

An investigation was made of the effects of water-cement ratio, type of reinforcing steel, aggregate size, relative humidity, concrete slice position, and two admixtures, sodium chloride and oleic acid, on the water vapor transmission of concrete. A collateral investigation was made of the water vapor transmission of aggregates, and a study was made of the growth of sodium chloride whisker crystals on concrete. Water vapor transmission rates were found to decrease with an increase in strength of concrete (decreased water-cement ratio), an increase in aggregate size, and the presence of sodium chloride. Rates appeared to decrease with an increase in relative humidity, but the data were inconclusive. The rates were found to be independent of the type of reinforcing steel and the absence or presence of oleic acid. The water vapor transmission rates of aggregates were found to be lower than the water vapor transmission rates of concrete., but were of the same order of magnitude. (Author)

AD-412 499 Div. 14, 17
(TISTM/AMS) OTS price $1.25

Rock Island Arsenal Lab., Ill.
GALVANIC PROTECTION BY METAL SPRAY METHOD,
by J. Knanishu. 1 May 63, 48p.
DA Proj. 1 H 0 24401 A 110
RIA 63 1419 Unclassified report

Descriptors: (*Flame spraying, Metal coatings), (*Metal coatings, Flame spraying), (*Corrosion inhibition, Metal coatings), Steel, Aluminum, Magnesium, Stainless steel, Copper, Corrosion, Adhesion, Tin, Salt spray tests, Experimental data, Aluminum coatings, Coatings, Protective treatments.

The metal flame-spray method of application was used to develop techniques, whereby bi-metal junctions may be treated with an optimum coating to combat galvanic corrosion. Steel, aluminum, and magnesium panels, and steel, aluminum, magnesium, stainless steel, and copper ''buttons'' were used in making up the corrosion couples. A successful procedure to produce reliable adhesion was developed. Where good adhesion procedures were maintained, excellent galvanic corrosion resistance resulted. Pure tin metal-sprayed coatings proved superior, generally, to aluminum (5056) metal-sprayed coatings as a guard against galvanic corrosion. Corresponding test panels were exposed in the 5% salt spray (fog) cabinet and outdoors. There was a correlation between the results obtained in the salt spray (fog) test and the outdoor test. (Author)

AD-412 500 Div. 14, 4
(TISTM/TCG) OTS price $.75

Rock Island Arsenal Lab., Ill.
THE PHYSICAL PROPERTIES OF VULCANIZATES BASED ON NBR/SBR BLENDS,
by Z. T. Ossefort. 13 May 63, 21p.
DA Proj. 1H 024401A110
RIA Rept. no. 63 1574
Unclassified report

Descriptors: (*Elastomers, Mechanical properties), (*Vulcanizates, Mechanical properties), (*Organic compounds, Elastomers), Butyl rubber, Nitrile rubber, Styrene plastics, Aging (Materials), Oils, Antioxidants, Brittleness.

A study was made of the properties of vulcanizates prepared from blends of nitrile-butadiene rubber (NBR) and styrene-butadiene rubber (SBR) elastomers. Resistance to petroleum oils, age resistance, including ozone resistance, properties at low temperatures, and processability were emphasized. Ratios of NBR/SBR from zero to one hundred percent (at increments of twenty) were studied using three curing systems, viz., sulfur plus accelerator, accelerators only, and dicumyl peroxide. The information presented should be of value in selecting elastomeric compositions to meet difficult Army needs. (Author)

AD-412 514 Div. 14, 30
(TISTM/TCG) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
INTERNAL STRESSES DEVELOPED IN AN EPOXY RESIN POTTING COMPOUND DURING LONG TERM STORAGE,
by Doris V. Steele. June 63, 23p.
NOL TR62 79 Unclassified report

Descriptors: (*Epoxy plastics, Embedding substances), (*Embedding substances, Epoxy plastics), (*Stresses, Test methods), Aging (Materials), Hardness, Elasticity, Polymerization, Storage, Strain gages, Transducers.

Test methods and instrumentation were developed to monitor internal stresses in epoxy resins by strain gage techniques. The work reported is for the final test sample only, and is indicative of the stresses developed on a plotted transducer during the polymerization of the epoxy resin and by thermal cycling of the potted unit at intervals of storage time. Test results show that the stresses developed during the first 70 hrs of room temperature polymerization reached 900 psi in axial compression on the transducer. Further polymerization during storage increased the stress to 2300 psi after 12 mos. Thermal cycling developed approximately 10,000 psi in compressive stress at -54 C. These stresses were relieved at 71 C but reappeared at the lower temperatures upon subsequent cooling. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-412 684 Div. 14, 25
(TISTM/EJH) OTS price $3.00

General Electric Co., Cincinnati, Ohio.
THORIUM OXIDE - DIFFUSION OF OXYGEN, COMPATIBILITY WITH BORIDES, AND FEASIBILITY OF COATING BORIDES BY PYROHYDROLYSIS OF METAL HALIDES.
Rept. for Apr 63-June 63,
by H. S. Edwards, A. F. Rosenberg, and J. T. Bittel. July 63, 142p.
Contract AF33 657 8470, Proj. 7350, Task 735001
ASD TDR63 635 Unclassified report

Report on Refractory Inorganic Nonmetallic Materials.

Descriptors: (*Graphite, Refractory coatings), (*Refractory materials, Graphite), (*Refractory coatings, Graphite), (*Oxygen, Diffusion), Thorium compounds, Borides, Dioxides, Chlorides, High-temperature research, Vapor plating, Diffusion, Compatibility.

Measurements of self-diffusion of oxygen in ThO2 were complicated by slow exchange at the surface. The measured values of the diffusion coefficient, D, range from 1.8 x 10 to the -13th power sq cm/sec at 800 C to 3.5 x 10 to the -8th power sq cm/sec at 1500 C. The rate constant of the surface reaction, K, ranged from 6.8 x 10 to the -10th power sq cm/sec at 800 C to 1.3 x -10th power sq cm/sec at 1500 C. Attempts to deposit dense impervious layers of ThO2 on selected solid borides by pyrohydrolysis of ThCl4 were essentially unsuccessful. Commercially available boride samples which were tested reacted with ThO2 at temperatures in the range 2400 to 2600 C. The boride samples also reacted with graphite in the temperature range of 2400 to 2700 C. Because of these reactions, a graphite-boride-thoria system will be useful for only limited times at temperatures above 2400 C. (Author)

AD-412 739 Div. 14, 12, 27
(TISTA/LSK) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
AN APPROACH TO ABLATION MATERIALS STUDY,
by D. Caum, B. Hartmann, F. J. Koubek and F. Robert Barnet. 22 Apr 63, 1v.
NOL TR63 100 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Ablation), (*Heat shields, Ablation), Heat transfer, Test methods, Test equipment, Electric arcs, Thermal insulation, Materials, Reentry vehicles.

A program is presented for the systematic study and development of ablation-type thermal insulator materials for use in both rocket propulsion systems and missile re-entry body heat shields. The goals of this program are: (a) to study the ablation phenomena in general, (b) to write empirical expressions for heat transfer in an ablating body, and (c) to develop and optimize ablation materials based upon (a) and (b). In the accomplishment of these goals, the ''alpha'' rod is proposed as the principal experimental technique by which materials will be evaluated over a wide range of environmental conditions. To provide flexibility in generating such test conditions, a gas stabilized arc heater capable of being programed through wide ranges of energy levels, pressures, chemical environments, and mass flow rates is proposed. (Author)

AD-412 758 Div. 14
(TISTM/AMS) OTS price $2.60

Horizons Inc., Cleveland, Ohio.
REINFORCEMENT OF NICKEL CHROMIUM ALLOYS WITH SAPPHIRE WHISKERS.
Interim rept. no. 3, 29 Mar-28 June 63,
by Robert H. Kelsey. 25 July 63, 21p.
Contract NOw630138
Unclassified report

Descriptors: (*Composite materials, Ceramic fibers), (*Reinforcing materials, Ceramic fibers), (*Ceramic fibers, Reinforcing materials), Powder metals, Oxygen, Aluminum compounds, Oxides, Iron, Fibers, Tensile properties, Metalorganic compounds, Coatings, Metal coatings, Nickel, Bonding, Nickel alloys, Chromium alloys, Aluminum, Deoxidation (Metallurgy), Sapphires, Heating, Manufacturing methods.

It has been found that the effect of excessive oxygen in composites of iron with alumina whiskers is a progressive loss of tensile reinforcement with heating. This loss can be prevented by the addition of aluminum metal to the melt, removing excess oxygen after the bond has been formed. Tensile reinforcement of 280% has been observed in iron containing 20 w/o alumina whiskers. The use of ferrous acetate as a coating for alumina whiskers has produced evidence of wetting between iron and alumina. Nickel-clad whiskers were cleaned entirely of metal when contacted with molten 80% Ni-20% Cr alloy. (Author)

AD-412 769 Div. 14, 31
(TISTM/TCG) OTS price $1.10

Naval Applied Science Lab., Brooklyn, N. Y.
PATROL CRAFT (HYDROFOIL), PCH-1.
2 Aug 63, 5p.
NYNS ML Lab. Project 4759 14
Unclassified report

Descriptors: (*Coatings, Corrosion inhibition), (*Cavitation, Erosion), (*Antifouling coatings, Paints), Foils, Flaps, Marine rudders, Protective treatments, Halocarbon plastics.

Cavitation erosion resistant coatings were applied to foils, struts, flaps and rudders. Condition after static immersion for four month period was observed. (Author)

AD-412 801 Div. 14
(TISTM/EJH) OTS price $3.60

Harris Research Labs., Washington, D. C.
ACCELERATED DETERIORATION OF TEXTILES.
Final rept. 1 Apr 61-30 Apr 63,
by Charles A. Rader and Anthony M. Schwartz.
30 Apr 63, 21p.
Contract DA18 108CML6606
Unclassified report

Descriptors: (*Cotton textiles, Degradation), (*Nylon, Degradation), (*Cellulosic plastics, Degradation), (*Degradation, Textiles), Cerium compounds, Copper compounds, Iron compounds, Nitrates, Nitrites, Photochemistry, Sodium compounds, Catalysis, Ultraviolet radiation, Chlorides, Sprays, Mechanical properties.

Studies of the accelerated degradation of cotton and nylon textiles were conducted along three major lines of investigation: (1) A variety of compounds were tested as degradation promoters on nylon and cotton (2) The photodegradation of cellulose, accelerated by various additives, in particular nitrite ion, was studied. (3) Methods were studied for applying degradation accelerators to fabrics. (Author)

AD-412 840 Div. 14
(TISTM/TCG) OTS price $.50

Rock Island Arsenal Lab., Ill.
EVALUATION OF ELASTOMERS FOR POTENTIAL USE AT CRYOGENIC TEMPERATURES,
by J. D. Ruby. 13 May 63, 20p.
DA Proj. 1HO 24401A110
RIAL Rept., no. 63 1573
Unclassified report

Descriptors: (*Elastomers, Brittleness), (*Synthetic rubber, Brittleness), (*Cryogenics, Elastomers), (*Organic compounds, Elastomers), Low temperature research, Rubber, Styrene plastics, Polyethylene plastics, Silicone plastics, Isocyanate plastics, Elasticity, Laboratory equipment, Vulcanizates.

The purpose of this work was to determine the lowest temperature at which a variety of rubber vulcanizates and other nonmetallic materials will remain nonbrittle and flexible and exhibit moderate recovery from applied deformation. The operation of a mechanically refrigerated low temperature test cabinet useful at temperatures down to -320 F is described. (Author)

AD-412 859 Div. 14, 26, 17
(TISTM/AMS) OTS price $1.60

Bendix Products Div., Bendix Corp., South Bend, Ind.
STRENGTHENING OF CHROMIUM-MAGNESIA COMPOSITES.
Interim rept. no. 2, 1 Apr-31 May 63,
by G. C. Reed. 14 June 63, 13p.
Contract N600 19 59647
Unclassified report

Descriptors: (*Composite materials, Extrusion), (*Extrusion, Composite materials), (*Ceramic materials, Composite materials), Chromium, Ductility, Alloys, Toughness, Impact shock, Tensile properties, Analysis, Magnesium compounds, Oxides, Microstructure, Densities, Transition temperature, Titanium, Powders.

A program aimed at strengthening chromium-ceramic composites by alloying is described. The notch tensile properties of Chrome-30 were previously evaluated at several stress concentration levels. Extrusions were prepared for evaluation of several compositional and processing variables aimed at improving ductility prior to initiation of the alloying study. The impact and tensile properties exhibited by these extrusions have now been determined and are reported herein. Pertinent chemical analyses are also reported. The best improvements were obtained by reducing the magnesia content. The compound containing three weight percent magnesia exhibited 45% tensile elongation at room temperature. It was decided that these results warranted further study before starting the alloy phase of this program. Four billets representing other low magnesia percentages have been prepared for this purpose. (Author)

AD-412 871 Div. 14, 25
(TISTM/TCG) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
MASTER CURVES FOR SOME AMORPHOUS POLYMERS,
by M. Takahashi, M. Shen, R. B. Taylor and A. V. Tobolsky. July 63, 24p. Technical rept. RLT61
Contract Nonr1858 07, Proj. NR356 377
Unclassified report

Descriptors: (*Polymers, Stresses), (*Plastics Creep), (*Organic compounds, Plastics), Relaxation time, Viscoelasticity, Acrylic resins, Styrene plastics, Tables, Test methods.

Master curves for polystyrene, polymethyl acrylate and polymethyl methacrylate in stress relaxation are reported. The method used to obtain a wide range in modulus is to combine torsional creep data for high modulus regions with direct stress relaxation data for low moduli. The composite curves obtained are compared with existing literature data. The master curve for polystyrene obtained by a ball indentation method is also reported. Characteristic viscoelastic parameters derived from the data are tabulated. (Author)

AD-412 906 Div. 14, 25
(TISTM/TCG) OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
STRESS RELAXATION OF MONO AND POLYDISPERSE POLYSTYRENE,
by A. V. Tobolsky, R. Schaffhauser and R. Bohme. Aug 63, 3p.
Contract Nonr1858 07, Proj. 356 377
ONR TR RLT63 Unclassified report

Descriptors: (*Styrene plastics, Stresses), (*Stresses, Styrene plastics), (*Plastics, Relaxation time), (*Organic compounds, Styrene plastics), Polymers, Molecular weight, Synthesis (Chemistry), Distribution.

AD-412 922 Div. 14, 4
(TISTM/TCG) OTS price $4.60

Union Carbide Plastics Co., Bound Brook, N. J.
RESEARCH ON IMPROVED EPOXY RESINS.
Quarterly progress rept. no. 1, 1 May-31 July 63,
by J. J. Madden, D. P. Norris, R. F. Sellers and S. G. Smith. 1 Aug 63, 37p.
Contract Nonr4172 00X
Unclassified report

Descriptors: (*Epoxy plastics, Molecular structure), (*Castings, Epoxy plastics), (*Filament wound construction, Plastics), (*Organic compounds, Ethers), Reinforcing materials, Compressive properties, Fracture (Mechanics), Deformation, Thermal stresses, Tensile properties, Shear stresses, Structures, Synthesis (Chemistry), Processing, Chromatographic analysis, Heating, Mechanical properties, Polymers, Underwater equipment.

The purpose of this program is to define the correlation of novel dieposide molecular configurations with the physical properties of cast resins as the initial step in providing significant improvements in filament reinforced plastics for deep submergence structures. Preparation of these novel dieposides and isolation of their isomers in sufficient quantities for measurement of mechanical properties of cast resin specimens is described. Progress on casting the resin specimens is presented along with a discussion of the proposed testing program. (Author)

AD-412 980 Div. 14
(TISTM/TCG) OTS price $1.60

Naval Applied Science Lab., Brooklyn, N. Y.
LAMINATES AND ELASTOMERS UNDER DEEP SUBMERGENCE EXPOSURE.
Final rept., 4 Apr-25 July 62.
15 Aug 63, 1v.
NASL Rept. no. 6366 Unclassified report

Descriptors: (*Laminates, Exposure), (*Elastomers, Exposure), (*Polyester plastics, Foams), (*Underwater, Exposure), Synthetic rubber, Rubber coatings, Isocyanate plastics, Bonding, Steel, Filament wound construction, Epoxy plastics, Mechanical properties, Oceans, Degradation, Adhesion.

Plastic laminates, foams, elastomeric coverings and O-rings to the U. S. Naval Research Laboratory were subjected to deep submergence exposure to determine the effect of such exposure on the physical and mechanical properties of these materials. The specimens were exposed in the Tongue of the Ocean at a depth of 5700 feet. These samples were removed at the end of 111 days. (Author)

AD-413 005 Div. 14
(TISTP/AMS) OTS price $.75

Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL DIFFUSIVITY MEASUREMENTS ON METALS AND CERAMICS AT HIGH TEMPERATURES.
Report for 27 Feb-19 Dec 62,
by R. L. Rudkin. June 63, 16p.
Proj. 7360, Task 736001
ASD TDR62 24, pt. 2 Unclassified report

Descriptors: (*Thermal diffusion, Ceramic materials), (*Ceramic materials, Thermal diffusion), Beryllium compounds, Oxides, Aluminum compounds, Magnesium compounds, High temperature research, Thermal conductivity, Specific heat, Test equipment, Test methods, Spinels, Equations, Glass.

The U. S. Naval Radiological Defense Laboratory flash method of measuring thermal diffusivity has been extended to ceramics at high temperatures. Several problems encountered in applying this technique to ceramics are discussed: namely, heating the samples to a uniform temperature over the sample face; overcoming the transparency of the specimens to the radiation from the xenon flash lamp; and correcting for radiation heat losses from low thermal conductivity ceramic specimens at higher temperatures. Measurements of the thermal diffusivity of the following materials are reported up to the temperatures indicated: Pyroceram No. 9606 (1160 C), Pyroceram No. 9608 (1210 C), Pyroceram No. 9690 (1150 C), beryllium oxide (1780 C), aluminum oxide (four types) (1730 C), magnesium oxide (two types) (1370 C) and two spinels (1630 C). Heat capacity data have been obtained on Pyroceram No. 9608 between room temperature and 650 C. (Author)

AD-413 032 Div. 14, 17
(TISTM/BRW) OTS price $6.60

Defense Metals Information Center, Columbus, Ohio.
SELECTED ACCESSIONS,
comp. by Patricia B. Plate. June 63, 52p.
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Bibliographies, Materials), (*Materials, Bibliographies), Alloys, Metals, Ceramic materials, Glass, Graphite, Refractory materials, Refractory metals and alloys, Composite materials, Steel, Stainless steel, Coatings, Ablation, Plastics, Glass textiles, Adhesives, Pressure vessels, Rocket cases, Rocket motor nozzles, Welding, Corrosion, Bonding, Diffusion, Fatigue (Mechanics), Material forming, Oxidation, Abstracts.

AD-413 167 Div. 14
(TISTM/BRW) OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BONDING AGENTS AND THE TECHNOLOGY OF ADHESIVE BONDING (Klei i Tekhnologiya Skleivaniya), ed. by D. A. Kardashow. 6 June 63, 376p.
FTD TT62 1617 Unclassified report

Trans. from Oborongiz, Moskva, pp. 1-285, 1960.

Descriptors: (*Adhesives, Bonded joints), (*Bonding, Theory), Metals, Plastics, Epoxy plastics, Expanded plastics, Phenolic plastics, Polyamide plastics, Silicone plastics, Isocyanate plastics, Adhesion, Wood, Glass, Synthetic rubber, Ceramic materials, Paper, Textiles, Glass textiles, Honeycomb cores, Aircraft, Airframes, Quality control, Mechanical properties, Laminates.

This volume contains basic information on bonding agents based on phenol-formaldehyde, epoxy, polyurethane and polyamide resins, silicon-organic compounds and their combinations with other polymers. The basic properties of the adhesives are described, and certain problems of adhesive-bonding theory, as well as testing and quality-control methods for adhesive compounds, are examined. Problems of the technique of applying adhesive compounds are considered in detail. (Author)

AD-413 292 Div. 14
(TISTM/EJH) OTS price $7.70

New York U., Coll. of Engineering, N. Y.
DEVELOPMENT OF IMPROVED TITANIUM ORGANIC COMPOUNDS FOR USE AS HYDRAULIC FLUIDS.
Final rept.
15 July 63, 72p.
Contract NOw62 0647
Unclassified report

Descriptors: (*Lubricants, Hydraulic fluids), (*Metalorganic compounds, Hydraulic fluids), (*Organic compounds, Hydraulic fluids), (*Titanium compounds, Hydraulic fluids), (*Hydraulic fluids, Metalorganic compounds), Zinc compounds, Tin compounds, Boron compounds, Molybdenum compounds, Lubrication, Metals, Colorimetry, Synthesis (Chemistry), Organic phosphorus compounds, Heat-resistant materials, Oxidation, Stability, High temperature research, Viscosity.

A new type of high temperature lubricating fluid, based on multi metal organic fluids containing organic compounds composed of 2 and 3 metals is reported. One four-metal-organic fluid with lubricating properties was synthesized in preliminary form. The fluids contain Ti and usually Zn. Sn, B, or Mo have been introduced also. Lubrication properties of the compounds are explained as due to an affinity between the components and metal surfaces with which they come in contact, especially steel surfaces. Small scar marks were found in the Shell Four-Ball Wear-Tests, when the new compounds were used in dispersions in fluids of low viscosity and poor lubricity. (Author)

AD-413 314 Div. 14, 25
(TISTM/REB) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
POLYETHYLENE CRYSTALLIZED FROM THE MELT UNDER

ELEVATED PRESSURE,
by Bernhard Wunderlich and Tamio Arakawa.
31 July 63, 15p. Technical rept. no. 6
Contracts Nonr40144 and Nonr49119, Task NR051 428
Unclassified report

Descriptors: (*Polyethylene plastics, Crystallization), High pressure research, Supercooling, Temperature, Crystal structure, Surface properties, Polymers.

Polyethylene of the linear, low pressure type has been crystallized under pressure (up to 5400 atm.) from the melt. Crystallization conditions of constant supercooling and constant cooling rates were employed. The resulting solid was analyzed at atmospheric pressure. In contrast to solution crystallization under pressure above 2000 atm. extended chain lamellae of increasing thickness become dominant (see also preceding article). These show a maximum melting point of 140 C and in this research, densities of up to 0.994. Combining these data on large crystals with the experimental maximum melting temperatures and thickness data on low and atmospheric pressure crystallized lamellae yields a surface free energy of 91 ergs/sq cm for folded chain lamellae crystallized at low pressure. (Author)

AD-413 412 Div. 14, 17, 25
(TISTM/BRW) OTS price $6.60

Syracuse U., N. Y.
THE EFFECT OF STRESS CONCENTRATION ON THE FRACTURE AND DEFORMATION CHARACTERISTICS OF CERAMICS AND METALS.
Rept. for 2 Dec 61-1 Feb 63,
by V. Weiss, J. Sessler, K. Grewal and R. Chait.
Apr 63, 58p.
Contract AF33 616 7609, Proj. 7350, Task 735003
ASD TDR63 380 Unclassified report

Descriptors: (*Brittleness, Mechanical properties), (*Fracture (Mechanics), Stresses, Ceramic materials, Plastics, Metals, Elasticity, Plasticity, Deformation, Theory, Statistical analysis, Design, Acrylic resins.

The effects of non-uniform stress distributions on fracture strength were studied on four materials that exhibit brittle behavior; Wesgo AL995, Mykroy 750 and 1100 (ceramics) and Plexiglas (acrylic plastic). Analysis of the results of both notch tensile and bend tests on these materials indicate that fracture in ceramic materials can be explained by a maximum fracture stress concept provided that the inherent inhomogeneity of these materials is considered in the analysis. Weibull's statistical theory of fracture appears to be applicable to the analysis of inhomogeneity. The behavior of Plexiglas is similar to that previously observed for high strength metals. (Author)

AD-413 495 Div. 14, 4
(TISTM/TCG) OTS price $2.60

Frick Chemical Lab., Princeton U., N. J.
VISCOELASTIC PROPERTIES OF PLASTICIZED POLYVINYL CHLORIDE,
by R. B. Taylor and A. V. Tobolsky. July 63, 26p.
Technical rept. no. RLT62
Contract Nonr85807, Proj. NR356 377
Unclassified report

Descriptors: (*Polyvinyl chloride, Viscoelasticity), (*Plastics, Viscoelasticity), (*Organic compounds, Polyvinyl chloride), Plasticizers, Molecular structure, Styrene plastics, Stresses, Relaxation time.

Master curves in stress-relaxation for several samples of polyvinyl chloride plasticized by varying proportions of dioctyl phthalate (di(2 ethyl-hexylphthalate)) are reported and discussed in terms of plasticizer concentration and polymer structure. Modulus-temperature curves derived from the data are also shown. Comparisons are given of plasticized compositions of polyvinyl chloride and polystyrene. The useful commercial properties of polyvinyl chloride are discussed in the light of data on the polymer structure and plasticizer action. (Author)

AD-413 499 Div. 14, 17, 25
(TISTM/AMS) OTS price $1.60

Duke U., Durham, N. C.
SOME PHYSICAL PROPERTIES OF CERTAIN MAGNETIC COMPOUNDS AT VERY LOW TEMPERATURES.
Final rept. 1 Apr 60-31 Aug 63,
by Horst Meyer. 31 Aug 63, 14p.
Grant DA ORD4
AROD 2558 7 Unclassified report

Descriptors: (*Cryogenics, Magnetic materials), (*Magnetic materials, Cryogenics), Liquids, Solids, Thermodynamics, Hydrostatic pressure, Nitrogen, Hydrogen, Density, Nuclear magnetic resonance, Molybdenum, Specific heat, Superconductivity, Aluminum, Physical properties, Solidified gases, Nuclear properties, Transition temperature, Data.

AD-413 506 Div. 14
(TISTM/BRW) OTS price $1.60

Naval Applied Science Lab., Brooklyn, N. Y.
PLASTICS, NATURAL WEATHER AGING PROGRAM ON, REPORT OF THREE AND FOUR YEARS WEATHER AGING.
Progress rept. no. 4,
by D. H. Kallas. 5 Aug 63, 11p.
Proj. 6035
Unclassified report

Descriptors: (*Plastics, Environmental tests), (*Laminates, Aging (Materials)), Reinforcing materials, Glass textiles, Mechanical properties, Heat resistant plastics, Polyester plastics, Polyvinyl chloride, Acrylonitrile polymers, Acetyl plastics, Carbonates, Experimental data, Thermoplastics.

AD-413 507 Div. 14, 25
(TISTM/RGR) OTS price $1.10

Textile Research Inst., Princeton, N. J.
DIMENSIONAL CHANGES IN POLYADENYLIC ACID AND FRACTIONATED POLYETHYLENE,
by V. D. Gupta and A. V. Tobolsky. July 63,
5p. Technical rept. no. 1
Contracts Nonr4184 00 and Nonr4184 01
Unclassified report

Descriptors: (*Adenosine phosphates, Polymers), (*Polyethylene plastics, Molecular structure), Crystal structure, Temperature, Mathematical analysis, Nucleotides.

AD-413 567 Div. 14, 17
(TISTM/BRW) OTS price $1.75

Defense Metals Information Center, Columbus, Ohio.
SUMMARY OF THE SEVENTH MEETING OF THE REFRACTORY COMPOSITES WORKING GROUP,
by W. A. Gibeaut and H. R. Ogden. 30 May 63, 1v.
Rept. 184
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Refractory metals and alloys, Protective treatments), (*Symposia, Refractory materials), (*Composite materials, Refractory materials), Coatings, Ceramic materials, Thermal insulation, Metal coatings, Ceramic coatings, Heat shields, Reentry vehicles, Combustion chambers, Refractory coatings.

This report summarizes information on refractory composites for use above 2500 F, as presented at the Seventh Meeting of the Refractory Composites Working Group, held March 12-14, 1963. Reports presented at the meeting were concerned with protective coatings, insulating ceramics, materials for rocket thrust chambers, dispersion strengthening of metals, joining of refractory materials, and testing techniques. Emphasis in the field of coatings for refractory metals has shifted from the rudiments of developing oxidation-resistant coatings to improvement and advanced evaluation of coatings to predict their utility for re-entry vehicles. (Author)

AD-413 572 Div. 14
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GLASSES OF THE SYSTEM Na20--Zno--A1203--P205 AS THE BASIS OF ENAMELS ON ALUMINUM,
by V. V. Vargin and T. S. Tsekhomskaya.
4 June 63, 12p.
FTD TT63 464 Unclassified report

Trans. from Zhurnal Prikladnoy Khimii, 35:11, pp. 2363-2368, 1962.

Descriptors: (*Phosphate glass, Melting), (Ceramic coatings, Aluminum), Oxides, Sodium compounds, Aluminum compounds, Phosphorus compounds, Zinc compounds, Phase studies, Stability.

AD-413 705 Div. 14, 25
(TISTM/BRW) OTS price $1.10

Cincinnati U., Ohio.
RESEARCH AND DEVELOPMENT RELATED TO KNUDSEN EFFUSION EXPERIMENTS.
Quarterly rept., 15 Jan-15 Apr 63,
by Michael Hoch. 5 July 63, 5p.
Contract AF33 657 9048, Proj. 7360, Task 736004
Unclassified report

Descriptors: (*High temperature research, Mass spectroscopy), (*Aluminum compounds, Nitrides), (*Refractory materials, Vaporization), Iridium compounds, Carbides, X-ray diffraction analysis, Graphite, Tungsten.

AD-413 754 Div. 14
(TISTM/AMS) OTS price $14.00

Hughes Aircraft Co., Culver City, Calif.
INDIUM ANTIMONIDE. DATA SHEETS,
by M. Neuberger. Feb 63, 201p. Rept. no. DS121
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Indium alloys, Antimony alloys), (*Antimony alloys, Indium alloys), Data, Experimental data, Absorption, Diffusion, Dielectric properties, Electrical conductance, Resistance (Electrical), Energy, Hall effect, Radiation damage, Life expectancy, Magnetic properties, Piezoelectric effect, Surface properties, Reflection, Refractive index, Thermoelectricity, Work functions, Electrical properties, Semiconductors.

AD-413 793 Div. 14
(TISTM/REB) OTS price $1.60

Timely Technical Products Div., Fluorocarbon Co., Pine Brook, N. J.
INVESTIGATION OF SEAL DESIGN AND SEALING TECHNIQUES FOR KEL-F AND TEFLON.
Quarterly rept. no. 1,
by John J. Piszko. 15 July 63, 14p.
Contract DA18 108amc111
Unclassified report

Descriptors: (*Sealing compounds, Organic compounds), (*Organic compounds, Sealing compounds), (*Containers, Plastics), (*Halocarbon plastics, Containers), Halogenated hydrocarbons, Induction heating, Spin, Manufacturing methods.

Work was concentrated on: (1) Induction heat sealing, (2) Spin sealing, (3) Sealing with special fluorocarbon base sealing material, (4) Contact heat sealing. (Author)

AD-413 809 Div. 14, 25
(TISTM/BRW) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
MAGNESIUM OXIDE. DATA SHEETS,
by John T. Milek. June 63, 45p. Rept. no. DS125
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Electric insulation, Materials), (*Magnesium compounds, Oxides), (*Dielectrics, Magnesium compounds), Data, Dielectric properties, Temperature, Frequency, Crystals, Porosity, Pressure, Electrical properties, Electrical conductance, Single crystals, Resistance (Electrical), Photoconductivity, Electron bombardment, Ultraviolet radiation, Thermoelectricity, Thermionic emission, Photoelectric effect.

AD-413 813 Div. 14
(TISTM/AM) OTS price $1.60

Hughes Aircraft Co., Culver City, Calif.
SILICON: DEBYE TEMPERATURE. DATA SHEETS,
by M. Neuberger. Jan 63, 10p. Rept. no. DS118
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Silicon, Single crystal), Specific heat, Data, Semiconductors, Materials, Tables.

AD-413 831 Div. 14
(TISTM/AMS) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
BERYLLIUM OXIDE. DATA SHEETS,
by John T. Milek. Mar 63, 21p. Rept. no. DS123
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Beryllium compounds, Oxides), Electric insulation, Data, Experimental data, Dielectric properties, Resistance (Electrical), Frequency.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The

Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Beryllium Oxide. (Author)

AD-413 834 Div. 14, 25
(TISTM/BRW) OTS price $5.60

Hughes Aircraft Co., Culver City, Calif.
STEATITE. DATA SHEETS,
by John T. Milek. Feb 63, 49p. Rept. no. DS122
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Talc, Electrical properties), (*Electric insulation, Talc), Dielectrics, Dielectric properties, Ceramic materials, Magnesium compounds, Silicates, Oxides, Frequency, Data, Temperature, Particle size, Resistance (Electrical).

AD-413 891 Div. 14
(TISTP/ODN) OTS price $3.60

Hughes Aircraft Co., Culver City, Calif.
SILICON: ABSORPTION. DATA SHEETS,
by M. Neuberger. Dec 62, 34p. Rept. no. DS117
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Silicon, Absorption), (*Semiconductors, Silicon), Materials, Data, Electrical properties, Bibliographies, Crystals, Absorption spectrum.

AD-413 906 Div. 14
(TISTM/BRW) OTS price $6.60

Hughes Aircraft Co., Culver City, Calif.
SILICONE RUBBER DATA SHEETS,
by John T. Milek. June 63, 59p. Rept. no. DS127
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Electric insulation, Silicone plastics), (*Silicone plastics, Dielectric properties), Data, Resistance (Electrical), Frequency, Temperature, Aging (Materials), Water, Radiation damage, Thickness, Electric potential, Electrical properties, Environmental tests, Additives.

AD-413 907 Div. 14
(TISTM/BRW) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
POLYTETRAFLUOROETHYLENE PLASTICS DATA SHEETS,
by Emil Schafer. June 62, 37p. Rept. no. DS106
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Electric insulation, Halocarbon plastics), (*Halocarbon plastics, Dielectric properties), Data, Electrical corona, Electron bombardment, High temperature research, Frequency, Temperature, Radiation damage, Gamma rays, Aging (Materials), Thickness, Films, Resistance (Electrical), Environmental tests.

AD-413 910 Div. 14
(TISTM/BRW) OTS price $1.10

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Bi-monthly progress rept. no. 3, 15 May-14 July 63,
by P. T. B. Shaffer and H. D. Batha. 15 July 63, 4p.
Contract N600 19 59749
Unclassified report

Descriptors: (*Ceramic materials, Single crystals), (*Single crystals, Mechanical properties), (*Silicon compounds, Carbides), Thickness, Elasticity, Hardness, Crystal lattice defects, Impurities, Boron.

The interrelationships of strength, crystal thickness and boron concentration in silicon carbide have been evaluated. Definite trends toward higher strength in both thin and pure silicon carbide crystals are shown. Neither purity nor thickness has a significant effect on Young's modulus of elasticity of silicon carbide. Similar relationships between purity and microhardness of silicon carbide are being evaluated. Grinding and lapping of silicon carbide crystals, if confined to the face loaded in compression, have no significant effect. (Author)

AD-413 928 Div. 14, 8
(TISTM/AM) OTS price $13.50

General Telephone and Electronics Labs. Inc., Bayside, N. Y.
STUDIES OF ELECTRON TUBE MATERIALS AND THERMIONIC EMISSION PROCESSES.
Final rept.,
by John V. Florio, A. Sandor and Robert A. Wallace. 31 Jan 63, 186p. Rept. no. TR62 704 104 204 208 23
Contract AF19 604 7286, Proj. 4619, Task 461901
AFCRL 63 194 Unclassified report

Descriptors: (*Thermionic emission, Materials), Coatings, Cathodes (Electron tubes), Nickel, Test method, Microscopy, Emissivity, Oxides, Instrumentation, Vacuum, Diffusion, Diodes, Tungsten, Impregnation, Mass spectroscopy, High temperature research, Liarium, Tables, Design, Aging (Materials), Anodes (Electron tubes), Molybdenum, Theory, Test equipment.

The thermionic emission properties of ultra-pure nickel-base oxide cathodes in a clean test diode were investigated. The effects of electrolytic activation, life-test conditions and gas ambient on thermionic emission were evaluated. The emission properties of pure nickel-base cathodes are compared with cathodes containing known impurities in the base metal or the coating and the effects of these impurities on emission are evaluated. The influence of the anode on cathode activation is shown. Measurements of the sublimation from various metal-base oxide cathodes are described. A Knudsen cell mass spectrometer system was designed and assembled for the study of high-temperature reactions between tube materials. The Knudsen cell was operated in the mass spectrometer at temperatures up to 2600 K, and the system was calibrated on the basis of published data of vapor pressure versus temperature for pure silver. (Author)

AD-413 939 Div. 14
(TISTP/AMS) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
ZINC TELLURIDE DATA SHEETS,
by M. Neuberger. June 62, 24p. Rept. no. DS108
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Zinc alloys, Tellurium alloys), (*Tellurium alloys, Zinc alloys), Semiconductors, Data, Experimental data, Absorption, Electrical conductance, Energy, Hall effect, Mobile, Resistance (Electrical), Electrical properties, Single crystals, Photoconductivity.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Zinc Telluride. (Author)

AD-413 940 Div. 14
(TISTM/REB) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
POLYTRIFLUOROCHLOROETHYLENE PLASTICS DATA SHEETS,
by Emil Schafer. June 62, 20p. Rept. no. DS107
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Electric insulation, Halocarbon plastics), (*Halocarbon plastics, Data), Dielectric properties, Surface properties, Resistance (Electrical).

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on polytrifluorochloroethylene plastics. (Author)

AD-413 956 Div. 14
(TISTM/REB) OTS price $1.60

Interchemical Corp., New York.
FORMULATION OF COATING MATERIALS WITH OPTIMUM DE-ICING OR ANTI-ICING PROPERTIES.
Progress rept. no. 1, 1 Feb-30 Apr 53,
by C. J. Rolle, John J. Godfrey and Ursula Franzel. 30 Apr 53, 15p.
Contract NOas53 339c, Proj. 1212 321
Unclassified report

Descriptors: (*De-icing materials, Coatings). (*Coatings, De-icing materials), Varnishes, Nitrocellulose, Vinyl plastics, Hydrocarbons, Pigments, Test methods, Ice, Adhesion.

AD-413 961 Div. 14, 1, 12
(TISTM/BRW) OTS price $1.60

Tracor Inc., Austin, Tex.
DEVELOPMENT OF A TRANSPARENT PRESERVATIVE COMPOUND FOR AIRCRAFT STRUCTURAL METALS.
Final rept.,
by Robert R. Annand and Jimmie S. Payne, Jr.
27 June 63, 9p. Document no. TRACOR63 181U
Contract NOw 62 0549c
Unclassified report

Descriptors: (*Metals, Protective treatments), (*Coatings, Polymers), (*Polymers, Processing), Organic nitrogen compounds, Amines, Condensation reactions, Structural parts, Aircraft, Guided missiles.

The condensation of amines with carbonyl compounds was investigated with the goal of obtaining hydrocarbon soluble polymers containing the N-C-N (or gem-diamine) structure. Such polymers have been obtained, and have been shown to have promising properties for use as temporary protective coatings for metals. (Author)

AD-413 994 Div. 14
(TISTM/BRW) OTS price $4.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
MICROSTRUCTURE STUDIES OF POLYCRYSTALLINE REFRACTORY OXIDES.
Summary technical rept., 12 June 62-12 June 63,
by J. B. Mitchell, R. M. Spriggs and T. Vasilos.
7 Aug 63, 46p. Technical rept. no. RAD TR63 32
Contract NOw 62 0648c
Unclassified report

Descriptors: (*Refractory materials, Mechanical properties). (*Aluminum compounds, Oxides). (*Magnesium compounds, Oxides), High temperature research, Microstructure, Ceramic materials, Density, Porisity, Grain-structures (Metallurgy). Crystals, Fracture (Mechanics), Fractography, Elasticity, Crystal lattice defects, Loading (Mechanics). Deflection, Creep.

The elastic modulus and transverse bend strength of pure, dense alumina and magnesia specimens were determined as a function of grain size (1 to 250 microns) and temperature over the range of 30 to 1500 C. The elastic modulus of both compounds was found to be essentially independent of grain size over the temperature range covered. The transverse bend strength of fine-grain-size alumina was found to be substantially greater than larger-grain-size alumina over the entire temperature range although, at the highest temperatures, the rate of decrease of strength with temperature was greatest for the fine-grain material. The transverse bend strength of magnesia was less dependent on grain size than the alumina; and, in addition, this dependence showed further decreases with temperature. At higher temperatures, the larger-grain-size specimens exhibited greater strengths than the fine-grain magnesia. (Author)

15. MATHEMATICS

AD-411 770 Div. 15
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON THE NUMERICAL SOLUTION OF LINEAR DIFFERENCE EQUATIONS WITH AXILIARY CONDITIONS AT BOTH ENDS,
by T. N. E. Greville. May 63, 20p. TSR400
Contract DA11 0220RD2059
Unclassified report

Presented at the Ninth Conference of Army Mathematicians, Watervliet Arsenal, Watervliet, New York, 5-6 June, 1963.

Descriptors: (*Difference equations, Numerical analysis), Sequences, Polynomials, Matrix algebra, Numerical methods and procedures, Simultaneous equations.

Methods are presented for the numerical solution of linear difference equations, when the solution is rendered unique, not by the specification of a full set of starting values at one end of the solution sequence, but by the imposition of linear auxiliary conditions on the terms of the sequence near both ends. The cases of constant coefficients and variable coefficients are treated separately. In the former case, the roots of the auxiliary polynomial are not used, and advantage is taken of the fact that, once a particular solution of the homogeneous equation is available, additional linearly independent solutions can be obtained by merely replacing the argument x by x + 1, x + 2, etc. In the latter case, the initial auxiliary conditions are used to reduce the number of linearly independent solutions of the homogeneous equation in terms of which the desired solution is expressed. Numerical examples are given. (Author)

AD-411 771 Div. 15
(TISTP/RLG) OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
DISCRETE POTENTIAL AND BOUNDARY VALUE PROBLEMS,
by Charles Saltzer. May 63, 42p. MRC technical summary rept no. 371
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Boundary value problems, Functional analysis), Functions, Difference equations, Integral equations, Potential theory, Operators (Mathematics), Green's function (Mathematics), Algebraic topology, Series.

The discrete potential function is used to reduce the boundary value problems for the Laplace difference equation to discrete analogues of the integral equations of potential theory for both finite and infinite regions in spaces of dimension greater than two. Uniqueness and existence theorems for the solutions of both the boundary value problems and the corresponding discrete potential equations are obtained by extending the combinatorial form of Stoke's Theorem to infinite complexes. (Author)

AD-411 772 Div. 15, 20
(TISTP/FEM) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
A PROBLEM OF RANDOM ACCELERATIONS,
by Wendell H. Fleming. June 63, 26p. TSR403
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Particle accelerators, Numerical methods and procedures), (*Partial differential equations, Boundary valve problem), Integrals, Integral equations, Statistical process, Motion, Velocity, Probability, Integral transforms, Differential equations, Bessel functions, Fourier analysis, Green's function.

The partial differential equation yu(x)+u(yy) = 0 is solved in a vertical strip. The method is first to solve the equation in the upper and lower halves of the strip. By matching u and u(y) across the x-axis a singular integral equation for u(x)(x,0) is obtained. This is converted into an equation with Cauchy kernel whose solutions are known explicitly. (Author)

AD-411 867 Div. 15
(TISTP/FEM) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
RECENT COMPUTATIONAL RESULTS IN THE NUMERICAL SOLUTION OF ELLIPTIC BOUNDARY VALUE PROBLEMS,
by Donald Greenspan. June 63, 12p. TS408
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Boundary value problems, Numerical methods and procedures), Algebra, Equations, Nonlinear differential equations, Partial differential equations, Geometry, Difference equations, Topology, Groups (Mathematics).

Computational techniques and numerical examples are described for (1) Dirichlet problems for delta u = u to the 2nd power, and (2) mixed problems for delta u = 0. All considerations are described in E to the 3rd power. (Author)

AD-411 875 Div. 15
(TISTP/MFA) OTS price $3.60

Michigan U., Coll. of Literature Science and the Arts, Ann Arbor.
NORMAL MONOIDS AND FACTOR MONOIDS OF COMMUNTATIVE MONOIDS,
by Yehoshafat Give'on. May 63, 38p. Rept. no. 05662 03105 25T
Contracts Nonr1224 21 and DA31 124ARO D G433
AROD 4049 1 Unclassified report

Descriptors: (*Automation, Theory), Factor analysis, Vector analysis.

AD-411 877 Div. 15
(TISTP/MFA) OTS price $3.60

California U., Berkeley.
INEQUALITIES FOR PERIODIC SURFACES OF VECTOR FIELDS,
by H. Rosenberg. May 63, 37p. Technical rept. no. 4
Contract Nonr222 88
Unclassified report

Descriptors: (*Inequalities, Vector analysis), (*Surfaces, Analysis), Algebraic topology, Sequences, Transformations (Mathematics).

Relations are discussed between invariant submanifolds of a class of vector fields on a closed manifold M, and the betti numbers of M. When the vector fields in question are gradient fields of nondegenerate functions on M, then our invariant submanifolds become the critical points of the function and relations the Morse Inequalities. For Morse Smale Dynamical Systems our submanifolds are the critical points and closed orbits of the vector field and the relations become the Smale Inequalities. (Author)

AD-411 878 Div. 15
(TISTP/MFA) OTS price $6.60

California U., Berkeley.
USING CHANGE OF VARIABLES TO FIND INVARIANT MANIFOLDS OF SYSTEMS OF ORDINARY DIFFERENTIAL

EQUATIONS IN A NEIGHBORHOOD OF A CRITICAL POINT, PERIODIC ORBIT, OR PERIODIC SURFACE. HISTORY OF THE PROBLEM,
by A. Kelley. May 63, 63p. Technical rept. no. 3
Contract Nonr22288
Unclassified report

Descriptors: (*Differential equations, Nonlinear systems), Partial differential equations, Linear systems, Taylor's series, Transformations (Mathematics), Polynomials, Complex variables, Bibliographies.

AD-411 921 Div. 15
(TISTP/MFA) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
THE MAXIMUM NUMBER OF DISJOINT PERMUTATIONS CONTAINED IN A MATRIX OF ZEROS AND ONES,
by D. R. Fulkerson. 1 May 63, 12p. Rept. no. 63 9RR
Contract Nonr22283
Unclassified report

Descriptors: (*Combinatorial analysis, Theory), (*Inequalities, Matrix algebra), Transformations (Mathematics), Functions, Networks.

AD-411 987 Div. 15
(TISTP/RLG) OTS price $3.60

Oslo U. (Norway).
ON NUMERICAL INTEGRATION OF CERTAIN PARTIAL DIFFERENTIAL EQUATIONS BY MEANS OF THE IMPROVED EULER-CAUCHY METHOD,
by A. Eliassen. 27 Apr 63, 29p. Technical note no. 1
Contract AF61 052 525
AFCRL 63 823 Unclassified report

Descriptors: (*Integration, Partial differential equations), Numerical methods & procedures, Differential equations, Stability, Errors, Equations, Time-lag theory, Damping.

The improved Euler-Cauchy method for numerical integration of ordinary differential equations is generalized to partial differential equations. The criteria for computational stability and the truncation errors are studied in connection with application to some simple, linear equations. The method has a built-in damping which increases with decreasing wave-length and increasing wave speed, and seems to be well suited for equations in time and one space coordinate. For equations in time and two space coordinates, however, a complication arises, and a shortening of the time step seems to be necessary in order to secure stability. (Author)

AD-412 332 Div. 15, 18, 22
(TISTP/AW) OTS price $2.60

General Electric Co., Philadelphia, Pa.
THE NORMAL BIVARIATE DENSITY FUNCTION AND ITS APPLICATIONS TO WEAPON SYSTEMS ANALYSIS, A REVIEW,
by H. C. Sebring. 10 Apr 62, 27p.
Unclassified report

Presented at the 590th Meeting of the American Mathematical Society, April 16-19, 1962, Atlantic City, New Jersey.

Descriptors: (*Circular error probable, Statistical distributions), (*Statistical distributions, Circular error probable), Distribution, Fire control systems, Weapon systems, Functions, Integrals, Probability, Special functions, Detection, Area coverage.

The normal bivariate density function is derived from a priori considerations. It is discussed in terms of probability area in a plane, and as a correlation surface. Several numerical methods of solving the normal bivariate distribution double integral are presented, and a curve is included for converting elliptical error distributions to circular probable errors. Regression and correlation coefficients are discussed. Relative to weapons systems analysis, examples are given of uses in studying impact and location errors. Analyses of search and detection for stationary and moving objects are given specific mathematical treatment. An Appendix examines the elliptical properties of normally correlated distributions. The investigation has resulted in a reference paper for the normal bivariate density function. (Author)

AD-412 352 Div. 15
(TISTP/FEM) OTS price $3.50

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
THE USE OF SAMPLE RANGES AND QUASI-RANGES IN SETTING EXACT CONFIDENCE BOUNDS FOR THE POPULATION STANDARD DEVIATION. II. QUASI-RANGES OF SAMPLES FROM A NORMAL POPULATION-PROBABILITY INTEGRAL AND PERCENTAGE POINT; EXACT CONFIDENCE BOUNDS FOR SIGMA,
by H. Leon Harter. Apr 63, 234p.
Proj. 7071, Task 7071 01
ARL 31, pt. 2 Unclassified report

Descriptors: (*Sampling, Population), (*Statistical distributions, Tables), Statistical functions, Probability, Integrals, Computers, Numerical methods and procedures.

For a normal population, reasonably good interval estimates of the population standard deviation sigma may be obtained from one suitable chosen sample quasi-range. The coefficients of the r(th) quasi-range w(r) in exact confidence bounds for sigma are found by taking the reciprocals of percentage points of the (standardized) quasi-range W(r) = w(r)/sigma, which are themselves found by inverse interpolation in a table of the probability integral. A discussion is given of criteria for best interval estimators, and a comparison is given of the results of interval estimation of the standard deviation sigma of a normal population from one quasi-range w(r) when the optimum value of r is chosen on the basis of two of these criteria: (1) minimizing the expected length of the confidence interval and (2) minimizing the mean squared deviation of the confidence bounds from the true value. Alternatively, these criteria may be stated as maximizing (1) the effectiveness or (2) the efficiency of the interval estimators. (Author)

AD-412 408 Div. 15
(TISTP/HG) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
TRANSLATION INVARIANT SUBSPACES OF FINITE DIMENSION,
by P. M. Anselone and J. Korevaar. May 63, 10p.
MRC Technical summary rept. no. 401
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Topology, Theory), (*Differential equations, Functions), Vector analysis, Matrix algebra, Transformations (Mathematics), Complex numbers.

Several simple proofs are given of the following theorem. Every finite dimensional translation invariant subspace W of the continuous functions on (minus infinity, infinity), or of the Schwartz distributions on (minus infinity, plus infinity), is spanned by a set of exponential monomials t to the (mu-1) power times e to the (lambda t) power, lambda = lambda sub 1, ..., lambda sub k. Thus, W is the solution space of a homogeneous linear ordinary differential equation with constant coefficients. (Author)

AD-412 410 Div. 15
(TISTP/MFA) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
GRADIENT PROJECTION IN HILBERT SPACE,
by A. A. Goldstein. June 63, 9p. Mathematical note no. 306; D1 82 0266
Unclassified report

Also available from the author.

Descriptors: (*Algebraic topology, Theory), Functions analysis, Measure theory, Operators (Mathematics).

This note embroiders two simple ideas. The first is a natural generalization of constructive techniques employed by Kantorovich and Altman for the minimization of quadratic functionals defined on a real Hilbert space H. The extension below is for the minimization of a twice differentiable functional defined on a closed linear manifold in H. Such an extension may appear superfluous because functionals arising in applications are often not even once differentiable. However, sometimes we can approximate well behaved non-differentiable functionals by a differentiable functional. This is the second idea. (Author)

AD-412 420 Div. 15, 25
(TISTP/MFA) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
CLASSIFICATION OF STATE DIAGRAMS,
by Donald Bowing Chin. June 63, 36p. Research rept. PIBMRI1155 63
Contract DA36 039sc78972
Unclassified report

Descriptors: (*Machines, Theory), (*Topology, Analysis), Sequential analysis, Matrix algebra, Tables.

A tabulation is made of distinct state diagrams by number of vertices and of directed edges. Two state diagrams with unlabeled vertices and labeled edges are counted as the same if they are topologically equivalent. Furthermore, a state diagram is classified, according to its property, into whether ergodic or non-ergodic, and whether simple or compound. The conditions for a state diagram not to be ergodic are discussed. (Author)

AD-412 437 Div. 15
(TISTP/FEM) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
A MATHEMATICAL MODEL OF BLUM'S THEORY OF PATTERN RECOGNITION,
by John Christopher Kotelly. Apr 63, 25p.
AF Proj. 4645
AFCRL 63 164 Unclassified report

Descriptors: (*Pattern recogniton, Mathematical models), Synthesis, Geometric forms, Reading machines, Topology.

A geometrical interpretation of Blum's Theory of Pattern Recognition is presented, which has as its underlying premise the non-flow-through of wave-fronts. The model is applied to the pattern masking phenomenon as worked on by Kolers of Harvard, giving a possible explanation of his results. (Author)

AD-412 476 Div. 15
(TISTP/MFA) OTS price $1.10

Courant Inst. of Mathematical Sciences, New York U., N. Y.
NOTE ON THE BUSY PERIOD IN THE CASE OF INFINITE MEANS,
by Herman Hanisch and Warren M. Hirsch. June 63 8p. Rept. no. IMM NYU 309
Contract Nonr285 38
Unclassified report

Descriptors: (*Queueing theory, Probability), (*Statistical distributions, Functions), Transformations (Mathematics), Integration, Distribution theory.

We consider in this note an ordinary single server queue in which the service time of the first customer is an arbitrary constant b, the service times of succeeding customers are independent, identically distributed random variables with an arbitrary distribution function G, and the inter-arrival times are independent, identically distributed random variables with an arbitrary distribution function F. (Author)

AD-412 496 Div. 15, 1
(TISTP/JP) OTS price $2.00

Battelle Memorial Inst., Columbus, Ohio.
RESEARCH AND STUDY OF ANALYTICAL TECHNIQUES FOR PREDICTING RELIABILITY OF FLIGHT-CONTROL SYSTEMS.
Final rept., 1 Feb 62-1 Jan 63,
by L. H. Stember, Jr., D. G. Mark, R. E. Mesloh, and A. A. Putnam. June 63, 67p.
Contract AF33 657 7978, Proj. 8225, Task 8220502
ASD TDR63 287 Unclassified report

Report on Research and Study of Analytical Techniques for Predicting Reliability of Flight-Control Systems.

Descriptors: (*Flight control systems, Reliability), (*Reliability, Mathematical prediction), Theory, Analysis of variance, Part differential equations, Hydraulic valves, Servomechanism.

The objective of the project was to develop analytical techniques to predict the performance of flight-control components (mainly mechanical, electromechanical, and electrohydraulic) with respect to time, whereby an inference to their reliability could be made without resorting to life testing of the components themselves. Reliability is defined as the probability that a device will exhibit a required performance under a specific environment for a certain time interval. The method of analytical reliability prediction being developed at Battelle uses a model that relates performance aspects of a device to its input and internal parameters.

From this model, partial derivatives of each performance aspect with respect to internal parameters are computed. A propagation of Variance formula which utilizes the partial derivatives and values of parameter variance is used to compute the variance (an index of variability) of each aspect of device performance. A reliability estimate can then be obtained by comparing the expected range of variability with appropriate specification limits. (Author)

AD-412 520 Div. 15, 32
(TISTP/MFA) OTS price $2.60

California U., Los Angeles.
MEASURING UTILITY BY A SINGLE-RESPONSE SEQUENTIAL METHOD,
by Gordon M. Becker, Morris H. DeGroot and J. Marschak. July 63, 19p. Working paper no. 37
Task 047 041
Unclassified report

Descriptors: (*Money, Measure theory), (*Sequential analysis, Mathematical analysis), Probability, Economics, Game theory.

A sequential experiment is described that provides, at each stage in the sequence, an estimate of the utility to the subject of some amount of a commodity (e.g., money), and to present a few experimental results obtained with the method. The procedure is based upon the following well-known expected utility hypothesis. For each person there exist numerical constants, called utilities, associated with the various possible outcomes of his actions, given external events not under his control. If, for a given subject, we could know the values of these constants and the (''personal'') probabilities he assigns to the various external events we can, according to this model, predict his choice from among any available set of actions: He will choose an action with the highest expected utility; i.e., with the highest average of utilities of outcomes, weighted by the probabilities he assigns to the corresponding events. He will be indifferent between any two actions with equal expected utilities. Note that (by the nature of weighted averages) the comparison between expected utilities does not depend on which two particular outcomes are regarded as having zero-utility and unit-utility. (Author)

AD-412 738 Div. 15
(TISTP/FEM) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
BERGMAN'S INTEGRAL OPERATOR METHOD IN GENERALIZED AXIALLY SYMMETRIC POTENTIAL THEORY,
by R. P. Gilbert. 14 June 63, 44p.
NOL TR63 124; m 36 Unclassified report

Descriptors: (*Potential theory, Partial differential equations), (*Partial differential equations, Operators (Mathematics)), Theory, Equations, Axially symmetric flow, Transformations (Mathematics), Functional analysis, Complex variables, Polynomials, Integrals.

The solutions of the partial differential equation for generalized axially symmetric potentials are investigated by means of integral operators. Results concerning singularities, residues, bounds, and growth are found, which are analogous to those of classical, analytic function theory. (Author)

AD-412 786 Div. 15
(TISTP/MFA) OTS price $5.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE CAUCHY PROBLEM FOR DEGENERATE PARABOLIC EQUATIONS OF STOCHASTIC CONTROL THEORY,
by Wendell H. Fleming. June 63, 51p. TSR402
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Stochastic processes, Theory), (*Operators (Mathematics), Game theory), Taylor's series, Diffusion, Measure theory, Inequalities, Partial differential equations, Probability.

The Cauchy problem is considered for quasi-linear parabolic partial differential equations of the type $L(u) + F(s,x,u,u_x) = 0$. The matrix of coefficients of the second order terms u_{xixj} in the second-order linear parabolic operator L is nonnegative definite, but not necessarily positive definite. Using a technique based on the theory of diffusion processes and game theory, a priori estimates for u and its gradient u_x are obtained. Theorems about the existence of generalized solutions and their dependence of small parameters are then proved. (Author)

AD-412 808 Div. 15
(TISTP/HG) OTS price $1.10

Adelphi College, Garden City, N. Y.
AN ERROR FORMULA FOR NUMERICAL DIFFERENTIATION,
by Herbert C. Kranzer. Aug 63, 8p. Rept. no. 108
Contract Nonr336001, Proj. NR041 252
Unclassified report

Descriptors: (*Numerical analysis, Theory), (*Integration, Errors), Polynomials, Equations, Integrals, Functions, Inequalities.

AD-412 860 Div. 15
(TISTP/MFA) OTS price $1.60

Illinois U., Urbana.
ON A GENERALIZED DIVISOR PROBLEM,
by R. D. Dixon. 1963, 10p.
Contract Nonr183418, Proj. NR 043 194
Unclassified report

Descriptors: (*Series, Functions), Number theory, Complex numbers.

AD-412 862 Div. 15
(TISTP/MFA) OTS price $3.60

Illinois U., Urbana.
ALMOST PRIMES GENERATED BY A POLYNOMIAL,
by Ronald Joseph Miech. 1963, 33p.
Contract Nonr183418, Proj. 043194
Unclassified report

Descriptors: (*Polynomials, Number theory), Numbers, Sequences, Errors, Inequalities.

AD-412 934 Div. 15
(TISTP/FEM) OTS price $3.60

Operations Research Center, U. of Calif., Berkeley.
PROBLEMS OF STATISTICAL INFERENCE FOR BIRTH AND

DEATH QUEUEING MODELS,
by R. W. Wolff. 25 Mar 63, 32p. Rept. no. ORC 63 3 RR
NSF Grant G21034
Unclassified report

Descriptors: (*Queueing theory, Models (Simulations)), (*Statistical processes, Theory), Statistical distributions, Statistical functions, Birth, Probability, Density, Mathematical models, Analysis of variance, Partial differential equations.

A large sample theory is presented for birth and death queueing processes which are ergodic and metrically transitive. The theory is applied to make inferences about how arrival and service rates vary with the number in the system. Likelihood ratio tests and maximum likelihood estimators are derived for simple models which describe this variation. Composite hypotheses such as that the arrival rate does not vary with the number in the system are considered. A numerical example illustrating these results is presented which includes the testing of both true and false composite hypotheses. (Author)

AD-412 936 Div. 15
(TISTP/MFA) OTS price $1.60

Columbia U., New York.
MONOTONICITY PROPERTIES OF THE POWER FUNCTIONS OF SOME TESTS IN TWO MULTIVARIATE PROBLEMS,
by S. Das Gupta and T. W. Anderson. 10 July 63, 13p. Rept. no. CU66 63Nonr266 33MS
Contract Nonr26633, Proj. NR042 034
Unclassified report

Descriptors: (*Analysis of variance, Theory). Transformations (Mathematics). Inequalities, Probability, Statistical tests, Functions, Convex sets, Determinants, Distribution theory.

Invariant procedures for testing a set of multivariate linear hypotheses in the linear normal model depend on the characteristic roots of a random matrix; similarly invariant test procedures for testing independence between two sets of normally distributed variates depend on the characteristic roots of another random matrix. In each case the power function of such a test depends on the characteristic roots of a corresponding population matrix as parameters; these roots may be regarded as measures of deviation from the hypothesis tested. Sufficient conditions on the procedure in each case for the power function to be a monotonically increasing function of each of the parameters are obtained. The likelihood-ratio test, Lawley-Hotelling trace test, and Roy's maximum root test satisfy these conditions. The monotonicity of the power function of Roy's test has been shown by Roy and Mikhail using a geometrical method. In only the unbiasedness of the maximum root test of independence was proved (although the authors claimed to prove the monotonicity property). (Author)

AD-412 937 Div. 15
(TISTP/FEM) OTS price $1.60

California U., Berkeley.
NON-NEGATIVE SOLUTIONS OF LINEAR INEQUALITIES,
by Gerard Debreu. June 63, 14p. Technical rept. no. 10
Contract Nonr22277, Proj. NR047 029
Unclassified report

Descriptors: (*Inequalities, Linear systems), Theory, Matrix algebra, Numerical analysis, Equations.

AD-413 087 Div. 15
(TISTP/FEM) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
FRACTIONAL INTEGRAL OPERATORS AND A HYPERGEOMETRIC FUNCTION TRANSFORM,
by T. P. Higgins. May 63, 20p. MN296; D1 82 0251
Unclassified report

Also available from the author.

Descriptors: (*Operators (Mathematical), Integration), (*Integral transforms, Polynomials), Special functions, Integrals, Differential equations, Algebra.

The representation of the Gauss hypergeometric function as a fractional integral is used to derive a hypergeometric function transform and its inversion. The integral operator approach makes the derivation of both the symmetric and the simple forms for inversion quite direct. A special case, the Jacobi transform, is given for both cases, and the reduction is also made to a Legendre function transform to obtain the symmetric inversion as well as one which is equivalent to the known simple one. The simple inversion might well be called the best inversion since the primary use of the symmetric inversion is verification of previous work derived by different methods. (Author)

AD-413 110 Div. 15
(TISTP/HG) OTS price $6.60

Numerical Analysis Research, U. of Calif., Los Angeles.
SPERNER'S LEMMA AND SOME EXTENSIONS,
by C. Tompkins. Aug 63, 64p.
Contract Nonr23376
Unclassified report

Descriptors: (*Algebraic topology, Analysis), (*Combinatorial analysis, Theory), (*Analytic geometry), Functions, Convex sets, Transformations (Mathematics), Games theory, Sequences, Partial differential equations, Real variables, Algebra, Complex numbers, Polynomials, Spheres.

AD-413 127 Div. 15
(TISTP/HG) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPROXIMATE INVESTIGATION OF SOME TYPES OF STRONGLY NONLINEAR AUTONOMOUS SYSTEMS,
by V. V. Kazakevich. 15 July 63, 62p.
FTD TT63 319 Unclassified report

Trans. from Russian Book, Avtomaticheskoye Upravleniye I Vychislitel'nogo Tekhnika, Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury, No. 5, Moskva, pp. 365-442, 1962.

Descriptors: (*Nonlinear systems, Numerical analysis), (*Algebras, Theory), Functions, Integration, Differential equations, Linear systems, Transformations (Mathematics), Motion, Velocity, Acceleration, Friction, Elasticity, Energy, Amplifier, Armature.

AD-413 136 Div. 15, 8
(TISTP/WH) OTS price $3.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
PROGRESSIVE RELIABILITY FUNCTIONS,

Division 15 - MATHEMATICS

by Nathan Grier Parke, III and C. Robert Montgomery. Jan 63, 22p. Scientific rept. no. 1
Contract AF19 628 2417, Proj. 4608, Task 460804
AFCRL 63 163 Unclassified report

Descriptors: (*Statistical distribution, Reliability (Electronics), (*Reliability, Statistical distribution), Tables, Numerical methods and procedures.

This is concerned with the mathematical problem of calculating progressive reliability functions, given the underlying cumulative distribution. A graphical technique is developed for empirically given distributions. Formulas are developed for the exponential, normal, Weibull, gamma and log-normal distributions. The method is illustrated in terms of a typical failure distribution. (Author)

AD-413 274 Div. 15, 30
(TISTP/MFA) OTS price $2.60

Rand Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING AND THE JACOBI CONDITION OF THE CALCULUS OF VARIATIONS,
by Stuart E. Dreyfus. Aug 63, 13p. Memorandum RM3714PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Calculus of variations, Programming (Computers)), Theory, Partial differential equations, Dynamic programming, Optimization, Taylor series.

In the dynamic programming approach to the calculus of variations, it is usually assumed that a descrete version of an optimization problem approaches the continuous statement as the increment in the independent variable approaches zero. This assumption is examined and a condition that must be satisfied if the passage to the limit is to be valid is discovered. This condition is shown to be equivalent to the Jacobi necessary condition of the classical theory. The exploration of this connection between dynamic programming and the classical theory yields a new form of the Jacobi condition. In its new form, the Jacobi condition is seen to provide a rule for adjusting the optimal solution to take account of slightly perturbed initial conditions. (Author)

AD-413 300 Div. 15
(TISTP/FEM) OTS price $5.60

RAND Corp., Santa Monica, Calif.
SOME APPLICATIONS OF POLYNOMIAL APPROXIMATION TO DYNAMIC PROGRAMMING,
by S. Azen, R. Bellman, and S. Dreyfus. Aug 63, 51p. Memo. no. RM3728PR
Contract AF49 638 700
Unclassified report

Report on Project RAND.

Descriptors: (*Polynomials, Optimization), (*Numerical methods and procedures, Dynamic programming), Functions, Sequences, Computer storage devices, Programming languages, Transformations (Mathematics), Integral equations, Numerical analysis, Programming (Computers).

AD-413 319 Div. 15
(TISTP/MB) OTS price $4.60

Princeton U., N. J.
GRAPHS AND COMBINATORICS CONFERENCE, PRINCETON UNIVERSITY, MAY 16-18, 1963,
Technical rept.
by John R. Edmonds, Jr. 1963, 1v.
Contract NONR1858-21
Unclassified report

Descriptors: (*Combinatorial analysis, Symposia).

This report is a simple record of the Conference, mainly via author's abstracts of the paper presented. Further information about these papers (or of papers presented in our weekly seminar) can be obtained only from the individual authors in whatever form of publication these authors may undertake. (Author)

AD-413 337 Div. 15, 25, 2
(TISTP/MFA) OTS price $3.20

Israel Inst. of Tech. (Haifa).
THE PHYSICAL TENSOR AND APPLICATIONS,
by Z. Karni. 7 Jan 63, 27p.
Grant AF EOAR62 57
AFOSR Rept. no. 4960 Unclassified report

Descriptors: (*Tensor analysis, Theory), (*Geodesics, Equations), (*Mechanics, Analysis) Determinants, Vector analysis, Transformations (Mathematics), Networks, Motion.

The definition of the physical tensor and tensor field, the transformation laws for its magnitudes with respect to orthogonal and oblique systems, the directional derivative of a tensor, the curvilinear derivative of the tensor magnitudes and the Christoffel tensor in orthogonal systems, a survey on multi-point tensors and multi-system magnitudes, the plane finite rotation tensor and the physical curvature tensor are reported. As applications, the transforming of a Cartesian tensor equation to curvilinear coordinates, a multi-relative motion with respect to curvilinear networks and the merging of the Lagrange equations of motion and the geodesics equation into a single physical tensor equation of the Newton type are discussed. (Author)

AD-413 363 Div. 15, 28, 26
(TISTP/FEM) OTS price $7.60

California U., Berkeley.
MATHEMATICAL SPECIFICATIONS OF GOALS FOR DECISION PROBLEMS.
by Roy Radner. June 63, 71p. Technical rept. no. 14
Contract Nonr22277, Proj. NR 047 029
Unclassified report

Descriptors: (*Decision making, Mathematical logic), (*Game theory, Statistical processes), Management engineering, Sequences, Stochastic processes, Linear programming, Operations research, Inequalities, Optimization, Special functions, Statistical functions, Mathematical models.

A taxonomy of relatively simple mathematical formulas for the representation of preferences and goals is presented. The emphasis is on examining how alternative formulas differ with respect to the structure of preferences represented (with particular reference to attitudes towards risk), and with respect to the techniques of problem solution to which they are adapted. The problem of how to formulate and solve a decision problem is itself a decision problem. Determining optimal procedures for searching for an optimum is discussed. (Author)

AD-413 371 Div. 15
(TISTP/JP) OTS price $3.60

RIAS, Inc., Baltimore, Md.
STUDY OF NONLINEAR MECHANICS.
Final rept. 31 Mar 58-31 Mar 63.
11 July 63, 33p.
Contract AF49 638 382, Proj. 9783, Task 37726
AFOSR 5130 Unclassified report

Descriptors: (*Differential equations, Research program administration), (*Control systems, Theory), (*Mechanics, Nonlinear systems), Topology, Nonlinear differential equations, Groups (Mathematics).

Contents: Research results: Asymptotic behavior, Functional-differential equations, Stability of dynamical systems, Mathematical theory of control, Qualitative theory of differential equations, Control theory; Publications: 1958-1963; Scientific activities.

AD-413 483 Div. 15
(TISTP/TL) OTS price $1.60

Illinois U., Urbana.
ON A GENERALIZED DIVISOR PROBLEM,
by R. D. Dixon. 1963, 10p.
Contract Nonr183418, Proj. NR043 194
Unclassified report

Descriptors: (*Series, Functions), (*Integral equations, Transformations (Mathematics)), Groups (Mathematics), Numbers, Complex numbers.

An asymptotic expansion is given for the summatory function of a Dirichlet series with positive coefficients which applies to $D_{\alpha}(x)$ when α is real and positive. (Author)

AD-413 484 Div. 15
(TISTP/HG) OTS price $3.60

Illinois U., Urbana.
ALMOST PRIMES GENERATED BY A POLYNOMIAL,
by Ronald Joseph Miech. 1963, 33p.
Contract Nonr183418, Proj. 043 194
Unclassified report

Descriptors: (*Number theory, Analysis), (*Polynomials, Theory), Sequences, Numbers, Transformations (Mathematics), Inequalities, Equations, Numerical analysis, Series, Algebra, Integrals.

AD-413 542 Div. 15
(TISTP/HG) OTS price $11.50

California U., Berkeley.
HOMOTOPY INVARIANTS ASSOCIATED WITH ELLIPTIC PARTIAL DIFFERENTIAL OPERATORS,
by J. F. Labrousse. July 63, 1v.
Contract Nonr222 62
Unclassified report

Descriptors: (*Algebraic topology, Transformation (Mathematics), (*Partial differential equations, Operators (Mathematics)), Algegras, Functions, Polynomials, Sequences, Conformal mapping, Inequalities, Integration, Integral transforms, Complex variables, Matrix calculus

AD-413 594 Div. 15
(TISTP/MFA) OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF REPRODUCING A HOMOGENEOUS FUNCTION OF TWO VARIABLES,
by I. V. Dem'yanchuk. 17 June 63, 3p.
FTD TT63 502 Unclassified report

Trans. from Russian Patent Nr. [illegible]5020, (Appl. Nr. 687642/26, pp. 1-2, 3 Dec 60.

Descriptors: (*Binomials, Functions), Numerical analysis.

AD-413 757 Div. 15
(TISTP/HG) OTS price $1.60

Wayne State U., Detroit, Mich.
ON THE SOLUTIONS OF THE WAVE EQUATION IN A QUADRANT OF R4,
by Y. W. Chen. 1962, 13p.
Grant AF AFOSR62 462
Unclassified report

Descriptors: (*Partial differential equations, Theory), (*Functions, Analysis), Analytic geometry, Integration, Operators (Mathematics), Spheres, Parabolic bodies, Curved profiles.

AD-413 950 Div. 15
(TISTP/MS) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
ESTIMATION OF PROBABILITIES ASSOCIATED WITH F STATISTIC BY DIGITAL COMPUTER TECHNIQUES,
by George I. Neel. Mar 63, 7p.
Proj. 7719, Task 771901
PRL TDR63 7 Unclassified report

Descriptors: (*Probability, Digital computers), (*Statistical distributions, Experimental data), (*Statistical tests, Errors), (*Programming (Computers), Statistical analysis), Psychometrics, Tables.

The F statistic is widely used to test the significance of experimental results in the behavioral sciences. Tabulations of probabilities for F values are available only for a few selected significance levels and degrees of freedom. This paper presents an efficient method for programming computation of the estimated probability for any specific F value. Probabilities are accurate to 4 decimal places and degrees of freedom may range from 4 to 1000. (Author)

AD-414 036 Div. 15
(TISTP/HG) OTS price $4.60

Yale U., New Haven, Conn.
GENERIC NORM OF AN ALGEBRA,
by N. Jacobson. 1963, 43p.
AF AFOSR61 29
Unclassified report

Descriptors: (*Algebras, Theory), (*Groups, Transformations), Polynomials, Functions, Matrix algebra

Division 15 - MATHEMATICS

AD-414 047 Div. 15
(TISTP/HG) OTS price $1.10

California U., Berkeley.
NON-ATOMIC MEASURES ON COMPACT HAUSDORFF SPACES,
by Morisuke Hasumi and G. L. Seever. 1962, 9p.
Grant AF AFOSR62 140
AFOSR 4899 Unclassified report

Descriptors: (*Topology, Theory), (*Measure theory, Analysis), Algebras, Functions, Transformations (Mathematics), Algebra.

AD-414 051 Div. 15
(TISTP/MS) OTS price $1.10

Harvard U., Cambridge, Mass.
EXTREMAL POLYNOMIALS AND THE ZEROS OF THE DERIVATIVE OF A RATIONAL FUNCTION,
by J. L. Walsh and O. Shisha. 1963, 10p.
Contract AF18 600 1461
AFOSR 4900
Unclassified report

Descriptors: (*Polynomials, Functions), Theory, Groups (Mathematics).

AD-414 083 Div. 15
(TISTP/HG) OTS price $2.60

Institute for Advanced Study, Princeton, N. J.
ON CAPACITABILITY AND MEASURABILITY,
by Maurice Sion. 1960, 21p.
AFOSR 5118 Unclassified report

Descriptors: (*Topology, Theory), (*Measure theory, Analysis), Potential theory, Algebra, Numbers, Functions, Numerical analysis, Sequences, Transformations (Mathematics), Spheres, Mathematical logic.

16. MEDICAL SCIENCES

AD-411 759 Div. 16
(TISTB/WA) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
THERAPY OF ACUTE UDMH INTOXICATION,
by Kenneth C. Back, Mildred K. Pinkerton and Anthony A. Thomas. June 63, 8p.
Proj. 6302, Task 620202
AMRL TDR63 44 Unclassified report

Report on Pharmacology and Biochemistry.

Descriptors: (*Toxicity, Rocket propellants), (*Rocket propellants, Toxicity), (*Hydrazine derivatives, Toxicity), Brain, Spinal cord, Therapy, Guided missile personnel, Vitamin B complex, Laboratory animals.

AD-411 769 Div. 16
(TISTB/WA) OTS price $.75

Yale U., School of Medicine, New Haven, Conn.
EFFECTS OF DECABORANE ON BRAIN ACTIVITY.
Rept. for 1 May 62-25 Feb 63,
by Jose M. R. Delgado. May 63, 19p.
Contract AF33 657 9021
AMRL TDR63 41 Unclassified report

Report on Toxic Hazards of Propellants and Materials.

Descriptors: (*Decaboranes, Metabolism), (*Toxicity, Decaboranes), Electroencephalography, Spinal cord, Autonomic nervous system, Histology, Primates, Brain, Laboratory animals.

The effects on intraperitoneal injection of decaborane have been investigated in monkeys with electrodes permanently implanted in the brain. One single injection of 5 mg/kg produced a marked behavioral depression, with only moderate electroencephalographic modifications, followed by death in 18 hours. Four daily doses of 3 mg/kg produced depression, somnolence, twitching in both arms, accompanied by bursts of high-voltage activity, localized in the internal capsule. Death occurred 3 days later. Daily doses of 1 mg/kg up to a total of 14 mg/kg produced depression, muscular twitching, anorexia, and a typical electroencephalographic pattern, but the animals recovered completely. Depression may be related to reticular system involvement. Motor symptomatology could depend on disturbances of heavily myelinated motor axons which may have a special affinity for the liposoluble decaborane. Hypothalamic involvement was questionable, but neighboring structures, especially the internal capsule showed electrical disturbances. (Author)

AD-411 787 Div. 16, 20
(TISTB/WA) OTS price $8.10

Research Triangle Inst., Durham, N. C.
EMERGENCY HEALTH PROBLEMS STUDY.
Final rept., Vol. 1,
by W. T. Herzog. 31 July 63, 1v.
Contract OCD OS62 250, OCD Proj. 2411A
Unclassified report

Descriptors: (*Public health, Nuclear warfare), Casualties, Population, Survial, Diseases, Epidemiology, Civil defense systems, Radioactive fallout, Shelters, Military medicine, Respiratory system, Infections.

The peacetime health status of the population (based on the U. S. Public Health Service National Health Survey) and the range of complications due to shelter living were evaluated. Rough estimates suggest that medical care and public health measures could add a number of survivors equal to 1 - 2 percent of the total preattack population during a single two-week period under ideal conditions. Postattack medical care of casualties would not seriously compete with measures directed toward health maintenance of the general population, except for consumable medical supplies. Because casualty care and health maintenance of non-casualties are capable of adding comparable numbers of survivors during the shelter period (a maximum of 2 percent of the preattack population for either type of emphasis), it is concluded that both approaches should be emphasized. The available data on chronic, non-communicable diseases is sufficient to allow more quantitative stockpile planning of medical items for these conditions in shelters. Further research will be necessary before this is true for communicable diseases, because of the complexity of disease spread during shelter confinement. A method for optimizing the allocation of drugs for support of non-communicable chronic and acute conditions to shelters in a stockpiling program is suggested and illustrated by an example. (Author)

AD-411 851 Div. 16, 8
(TISTP/MFA) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
NONLINEAR OSCILLATION AND NEUROELECTRIC PHENOMENA. PART I,
by Edmond M. Dewan. June 63, 40p.
Proj. 5635
AFCRL Rept. no. 63 149, pt. 1
Unclassified report

Descriptors: (*Bionics, Circuits), (*Neurology, Analysis), Oscillation, Nonlinear systems, Electroencephalography, Electronic equipment, Oscillators, Cells (Biology), Cerebral cortex, Epilepsy, Brain.

Normal and epileptic electroencephalographic phenomena are treated from a new point of view. Phenomena such as (1) spontaneity of normal discharges, (2) epileptic involvement of normal neurons, (3) epileptic hypersynchrony, (4) ''exhaustion,'' and (5) normal and epileptic excitation and suppression effects are compared to phenomena of nonlinear oscillations such as (a) ''soft'' limit cycle behavior, (b) ''hard'' limit cycle behavior, (c) nonlinear entrainment effects, (d) oscillation hysteresis and Van der Pol oscillations, and (e) asynchronous excitation and quenching effects, respectively. This paper treats (1), (2), and (a), (b), leaving the remainder to future communications. The goal of this work is to lead toward a mathematical phenomenological scheme which shows relationships between seemingly diverse neuroelectric activity and to suggest new experiments which will increase out understanding of the brain mechanisms responsible for normal and abnormal activity. (Author)

AD-411 860 Div. 16
(TISTB/WA) OTS price $1.60

Laboratory for Comparative Biochemistry, LaJolla, Calif.
RED CELL METABOLISM RELATED TO BLOOD STORAGE.
Progress rept., 1 Nov 61-30 June 63,
by Grant R. Bartlett. 26 July 63, 12p.
Grant DA MD49 193 63G92
Unclassified report

Descriptors: (*Erythrocytes, Metabolism), Adenosine phosphates, Phosphorylation, Tracer studies, Man, Blood, Storage, Nucleotides, Carbohydrates.

Red cells from fresh human blood were found to incorporate C14-labeled adenosine or adenine (when inosine was present) into ATP. No incorporation was obtained from C14-labeled hypoxanthine, inosine or adenine. A net synthesis of ATP above the steady-state level could account for the amount of incorporation and it was concluded that the turnover rate of ATP in this period of time was negligible. Further evidence for an active glycogen metabolism in the human red cell has been obtained in the form of a rapid turnover of both the sugar and phosphorus parts of UDPG and glucose-1, 6-diphosphate. A new sugar phosphate has been discovered to be a normal constituent of the human red cell and has been identified tentatively as mannose-1, 6-diphosphate. Of special significance was the finding by isotope analyses that this new compound is actively integrated with the sugar and phosphorus metabolism of the cell. The phosphorylated metabolites of the rabbit reticulocyte have been analysed and compared with those of the mature erythrocyte. The distinctive features of the glycolytic apparatus of the mature erythrocyte were found in the reticulocyte; the principle differences were the presence in the reticulocyte of small quantities of additional uridine, cytidine, and guanosine nucleotides. (Author)

AD-411 864 Div. 16, 15
(TISTP/RLG) OTS price $1.60

RAND Corp., Santa Monica, Calif.
A MATHEMATICAL MODEL OF RADIATION AND POPULATION OF CELL COLONIES. I. TWO-DIMENSIONAL RANDOM-WALK MODEL,
by Richard Bellman, Mortimer Elkind and Bella Kotkin. July 63, Memo. RM3665NIH
Grant RG9608

Unclassified report

Descriptors: (*Cancer, Cells (Biology)), (*Radiation effects, Population), (*Mathematical models, Growth), Radiological dosage, Statistical analysis, Statistical processes, Programming (Computers), Monte Carlo method, Stochastic processes.

To study the effect of radiation on the population of cell colonies a simple model is constructed that follows a cell through a two-dimensional random walk, where one dimension represents state of growth and the other represents state of health or number of sites damaged. The cell is subjected to radiation exposure at prescribed times and doses which can be varied. The cell will eventually either divide or become sterile. An IBM 7090 FORTRAN program of the Monte Carlo procedure presents a statistical summary of results at the absorbing barrier. (Author)

AD-411 947 Div. 16
(TISTB/WA) OTS price $23.50

Walter Reed Army Inst. of Research, Washington, D. C.
(No title).
Annual progress rept., vol. 1, 1 July 62-30 June 63.
30 June 63, 1v.

Unclassified report

Descriptors: (*Medical research, Military medicine), (*Military medicine, Medical research), Shock (Physiology), Anesthesia, Blood disorders, Kidney function tests, Blood circulation, Skin, Nutrition, Metabolism, Radioactive isotopes, Psychiatry, Disease vectors, Parasites, Immunology, Ecology, Germ-free animals, Veterinary medicine, Arthropods.

AD-411 948 Div. 16
(TISTB/WA) OTS price $23.50

Walter Reed Army Inst. of Research, Washington, D. C.
(No title).
Annual progress rept., vol. 2, 1 July 62-30 June 63.
30 June 63, 1v.

Unclassified report

Descriptors: (*Medical research, Military mediciene), (*Military medicine, Medical research), Veterinary medicine, Germ-free animals, Parasites, Culicidae, Diseases, Rickettsia, Tissue culture, Wound and injuries, Toxins and antitoxins, Biological assay, Nervous system, Psychiatry, Radioactive fallout, Metabolism.

AD-412 355 Div. 16
(TISTB/WA) OTS price $.75

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
STUDIES ON THE INTERRELATIONSHIP OF COLD ENVIRONMENT, IMMUNITY AND RESISTANCE TO INFECTION. I. QUALITATIVE AND QUANTITATIVE STUDIES ON THE IMMUNE RESPONSE,
by W. T. Northey. Apr 63, 26p.
Contract AF41 657 386, Proj. 8241 01
AAL TDR 62 48 Unclassified report

Descriptors: (*Infections, Immunology), Rabbits, Environmental tests, Antigens and antibodies, Low temperature research, Electrophoresis, Microorganism, Blood serum.

Immunochemical studies have been conducted on sera from rabbits to investigate the quantitative aspects of the immune response under conditions of hypothermia. Rabbits have been subjected to lowered environmental temperature (4 C), shaved of their pelage and immunized with various protein antigens. Serum samples obtained from varying periods during each of the studies via cardiac puncture have been qualitatively assayed for antibody response by Ouchterlony gel diffusion, immunoelectrophoresis, starch gel electrophoresis and paper electrophoresis. Quantitative analyses have included ring precipitin titrations, quantitative gel diffusion analysis and micro-quantitative precipitin analysis. In all of the studies the responses of the cold exposed animals have been compared with non-cold exposed animals treated in an identical manner except for maintenance at the lower environmental temperature. (Author)

AD-412 413 Div. 16
(TISTB/AAR) OTS price $1.60

Stanford U., Calif.
THE DISTRIBUTION OF BLOOD FLOW IN HUMAN SKIN.

Rept. for 1 July 60-30 June 62,
by J. M. Crismon. 16 May 63, 12p.
Grant DA MEDDH60 9

Unclassified report

Descriptors: (*Skin, Blood circulation), Man, Physiology, Distribution, Blood, Measurement, Iodine, Tracer studies, Radioactive isotopes.

Methods have been devised for simultaneous measurement of total forearm blood flow and clearance of I-131 from the skin after intradermal injection or inotophoresis of the isotope. These methods have been used to study the effects of reactive hyperemia, general body heating and the action of topically applied rubifacient substances on total forearm flood flow and upon clearance of I-131 from the skin. The increased blood flow of reactive hyperemia appears to be reasonably reflected during the early period of isotope clearance, but factors other than blood flow appear to dominate the clearance of isotope from skin 25 to 40 minutes after it is introduced. A method for graphical analysis of semilog plots of complex regressions with more than one exponent has been devised. (Author)

AD-412 416 Div. 16
(TISTB/WA) OTS price $3.60

Hahnemann Medical Coll. and Hospital, Philadelphia, Pa.
ABSORPTION OF RADIOACTIVE IODINE (NaI131) AND STRONTIUM (Sr85(NO3)2) THROUGH NORMAL SKIN, FIRST, SECOND, THIRD DEGREE BURNS AND OPEN TRAUMATIC WOUNDS.
Annual progress rept., 1 June 62-31 May 63,
by John M. Howard and W. William Salak.
31 May 63, 1v.
Contract DA49 007md991

Unclassified report

Descriptors: (*Radioactive isotopes, Absorption (Biological), (*Wounds and injuries, Radioactive isotopes), (*Protective coverings, Radioactive isotopes), Iodine, Strontium, Burns, Antibiotics, Skins, Ointments.

No penetration of I131 or Sr85 across normal, intact skin could be demonstrated. Variable amounts of I131 were absorbed through first degree burns on different days of the first week, depending upon associated trauma and ulcerations. Considerably larger amounts of I131 and Sr85 are absorbed through fresh second degree burns. The absorption decreases with the healing of the burn. Third degree burns follow a similar pattern of absorption as second with lesser quantities absorbed. Penetration of I131 and Sr85 across open traumatic wounds shows initially a lower amount in fresh bleeding wounds with the highest quantities being absorbed in one (1) day old wounds. Thereafter there is a decrease in absorption. Granulation tissues permit the passage of relatively constant amounts of ions. Among plain bandage, Furacin and petrolatum ointments, Rezifilm plastic spray and Vaseline gauze, used as protective dressings to prevent the absorption of radioactive fallout, Vaseline gauze was found to be the most effective. Current studies include the absorption of bacterial toxins and antibiotics across the wound surface. (Author)

AD-412 451 Div. 16
(TISTB/WA) OTS price $1.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
SOME DYNAMIC RESPONSE CHARACTERISTICS OF WEIGHTLESS MAN.
Final rept.,
by Charles Edward Whitsett, Jr. Apr 63, 50p.
Proj. 7184, Task 718405
AMRL TDR63 18

Unclassified report

Report on Design Criteria for Crew Stations in Advanced Systems.

Descriptors: (*Weightlessness, Space biology), (*Space biology, Weightlessness), Biophysics, Mathematical models, Dynamics, Man, Model tests, Torque, Simulation, Rotation.

By segmenting the body into 14 idealized masses, a mathematical model is developed to approximate the mass distribution, center of mass, moments of inertia, and degrees of freedom of a human being. An analysis of the model reveals that the segment moments of inertia about the mass centers of the hands, feet, and forearms are negligible when compared to the total body moments of inertia, although the torso moment of inertia is not negligible. Some selected problems in thrust misalignment, freebody dynamics, stability of rotation, and torque application are solved analytically to predict man's dynamic response characteristics in space. Preliminary experiments indicate that the torque which weightless man can exert by applying a sudden twist to a fixed handle varies as a halfsine wave, and is approximately 67% of his maximum torque under normal gravity conditions. (Author)

AD-412 524 Div. 16
(TISTB/AAR) OTS price $1.10

California U., Los Angeles.
CONDITIONED RESPONSE STUDIES OF THE DISCRIMINATION ABILITIES OF BLINDFOLDED PORPOISES.
Final rept., 1 Feb 62-30 June 63,
by Ronald N. Turner. 22 July 63, 7p.
Grant Nonr G00060 62 and Nonr G00013 63

Unclassified report

Descriptors: (*Aquatic animal, Conditioned reflex), Blindness, Selection, Behavior, Cetacea, Sound, Sound signals, Echo ranging.

AD-412 549 Div. 16
(TISTB/AAR) OTS price $8.10

Illinois U., Urbana.
THERMAL INJURY OF THE SKIN.
Annual progress rept., 1 May 62-1 May 63,
by Sol Roy Rosenthal, Gebhard Schumacher, George Crouse, Wilma A. Spurrier, and J. E. P. Libby.
1963, 86p.
Proj. NR114 161

Unclassified report

Descriptors: (*Skin, Thermal radiation), Wounds and injuries, Toxins and antitoxins, Antigens and antibodies, Burns, Man, Tissues, Immunology, Toxicity, Enzymes.

The objective of these studies up to the current period has been to determine whether or not the degradation products following tissue injury, specifically thermal, can be lethal and toxic to the host; to isolate and identify these 'toxins'; to determine whether these 'toxins' have the capacity of producing 'autoantibodies' in the injured host; and to determine if the blood of patients convalescing from extensive thermal injury will counteract the toxemia and reduce the mortality of severely burned human subjects. (Author)

Division 16 - MEDICAL SCIENCES

AD-412 550 Div. 16
(TISTB/WA) OTS price $6.60

Illinois U., Urbana.
THERMAL INJURY OF THE SKIN.
Annual progress rept., 1 May 61-1 May 62,
by Sol Roy Rosenthal. 1 May 62, 67p.
Proj. NR114 161
Unclassified report

Descriptors: (*Burns, Skin), Physiology, Toxin and antitoxins, Antigens and antibodies, Blood serum, Enzymes, Hemolysis, Agglutinins, Erythrocytes, Tissue extracts.

A modified ring precipitin test is described prolonging the time of incubation for sera and plasma, and using Blood Group Specific Substances for plasma. It is emphasized that the repetition of serologic findings will only be possible if potent acute and convalescent sera are available. Positive pecipitin ring tests were obtained with the sera from 50 acute burn cases (of varying degrees and extents as well as time after burning) when overlaid the sera or plasma of 49 convalescents in 56 to 61% of approximately 400 tests. When normal sera was used instead of the convalescent sera, up to 7.7% reacted. When normal sera was overlaid convalescent sera, up to 6.4% reacted. The percentage of reactions in acutely burned patients was directly related to the degree and extent of burn. Usually sera drawn one to 5 days after burning gave the most consistent results. Antibodies were detected in the highest percentage of cases within 6 months to one year after burning. The degree and extent of burn was directly related to the percentage of reactors and duration of the reaction. It has been suggested that blood banks store convalescent burn sera or plasma and that these be titered for potency before use. (Author)

AD-412 563 Div. 16
(TISTB/AAR) OTS price $.50

Utah U. Coll of Medicine, Salt Lake City.
INFLUENCE OF LOW AMBIENT TEMPERATURE ON RESISTANCE OF MICE TO EXPERIMENTAL COXSACKIE VIRUS INFECTION,
by S. Marcus, F. Miya, L. J. Phelps, and L. Spencer. Apr 63, 16p.
Contract AF41 657 311, Proj. 8241 1
AAL TDR62 56 Unclassified report

Descriptors: (*Viruses, Infections), (*Enteroviruses, Infections), Temperature, Mice, Hypothermia, Acclimatization, Immunology, Immunity, Exposure.

Adult albino mice were challenged intraperitoneally with Type B-1 Coxsackie virus under conditions of acclimatization and nonacclimatization to 1 C. The results show that exposure of unacclimatized mice to 2 C results in lowered host resistance but that specific immunization is effective in protection under these conditions. Mice acclimatized to 2 C for 40 days have increased resistance to challenge that is independent of specific immunization procedures. The mechanisms involved in protection under these circumstances remain to be explored. (Author)

AD-412 592 Div. 16
(TISTM/RGR) OTS price $1.10

Minnesota U., Minneapolis.
CHEMICAL AND BIOLOGICAL PROPERTIES OF MINERALIZED TISSUES.
Annual progress rept., 1 July 62-1 July 63,
by W. D. Armstrong and Leon Singer. 20 July 63, 5p.
Contract DA49 193md2366
Unclassified report

Descriptors: (*Fluorides, Chemical analysis), (*Bone, Diseases), (*Metabolism, Fluorides), Radioactive isotopes, Iodine, Thyroid gland, Skeleton.

Results of analysis for fluoride in plasma, urine and saliva obtained by microdiffusion of Hf in polypropylene Conway type cells are presented and compared with those obtained by conventional microfluoride methods. Results of examination of plasma of osteoporotic patients treated with large amounts of fluoride are summarized. Fluoride intake by rats was found not to influence the I-131 uptake by the thyroid glands or by other tissues. Rat bones of widely different fluoride contents did not differ in their in vivo uptake of radiofluoride. (Author)

AD-412 634 Div. 16
(TISTB/AAR) OTS price $2.60

Duke U., Durham, N.C.
PLASMA LIPID RESPONSES TO LEADERSHIP, CONFORMITY, AND DEVIATION,
by Kurt W. Back and Morton D. Bogdonoff.
1963, 26p. Technical rept. no. 10
Contract Nonr118181, Proj. NR177 470
Unclassified report

Descriptors: (*Blood plasma, Chemistry), Fatty acids, Chemical indicators, Autonomic nervous system, Nervous system, Atherosclerosis, Lipids, Blood chemistry, Leadership, Psychology.

Plasma free fatty acids (FFA) have been shown to be sensitive indicators of central and autonomic nervous system arousal as well as causative agents in atherosclerosis. Their measurement gives a possibility of assessing the meaning of variables introduced in social psychological experiments and comparing them with epidemiological evidence of the action of the same variables, namely pressure to conformity and responsibility of leadership. Four experiments, using a standard technique of producing experimental conformity, are described. (Author)

AD-412 649 Div. 16
(TISTB/AAR) OTS price $2.60

Biomedical Lab., Aerospace Medical Div.,
Wright-Patterson Air Force Base, Ohio.
LIFE SUPPORT SYSTEMS EVALUATOR CONSTRUCTION TECHNIQUES,
by William F. Mickelson. May 63, 17p.
AF Proj. 6373, Task 637305
AMRL TDR63 43
Unclassified report

Report on Equipment for Life Support in Aerospace.

Descriptors: (*Life support, Construction), Design, Feasibility studies, Test facilities.

The construction, plumbing, capability, and operation of the Life Support Systems Evaluator are described. The evaluator is a research tool for determining technical feasibility of techniques and principles involved in operation and design of life support equipment by integrated evaluation studies. The evaluator is operational and has provided very good results. (Author)

AD-412 670 Div. 16
(TISTB/AAR) OTS price $2.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
STUDIES OF CLASSICAL HEART RATE CONDITIONING IN THE RAT,
by David G. McDonald, John A. Stern, and William H. Hahn. Mar 63, 22p. Rept. no. 63 3
Unclassified report

Descriptors: (*Heart, Blood pressure), Rats, Conditioned reflex, Neurology, Cardiovascular system, Deceleration, Theory.

Four rat heart rate conditioning studies are presented. Measures were (1) HR changes during 8 sec. CS 9550 cps tone) and (2) immediately after the CS when the UCS (0.5 sec. shock) was not presented. Using analysis of variance, significant evidence of conditioning was found. The CR was a cardiac deceleration on early trials each day, followed by a cardiac acceleration on later trials. The orienting response to tone was found to show similar changes as a function of trials. It was concluded that previous investigators would have also observed conditioned acceleration had they given a larger number of conditioning trials. The data were viewed as consistent with a stimulus substitution theory of conditioning, although other hypotheses were not ruled out. (Author)

AD-412 692 Div. 16
(TISTB/AAR) OTS price $8.10

Army Research Inst. of Environmental Medicine, Natick, Mass.
(No title)
Progress rept. 1 July 62-30 June 63.
30 June 63, 78p.
Unclassified report

Descriptors: (*Environmental tests, Reports), Medicine, Exposure, Biology, Psychology, Climatology, Metabolism, Acclimatization, Rats, Temperature, Performance tests, Design, Physiology, Cells, Sociology, Ecology, Medical research.

AD-412 702 Div. 16
(TISTB/AAR) OTS price $1.60

Washington U., St. Louis Mo. School of Medicine.
QUANTITATIVE CYTOCHEMISTRY INVESTIGATION OF ACTIVITY OF CERTAIN ENZYMES IN LIVER.
Progress rept., 1 Aug 62-31 July 63,
by Robert E. Shank. Aug 63, 9p.
Contract DA49 007md1024
Unclassified report

Descriptors: (*Enzymes, Liver), Cytochemistry, Quantitative analysis, Metabolism, Cells, Chemical analysis, Proteins, Desoxyribonucleic acids, Rats, Glycolysis.

AD-412 706 Div. 16
(TISTB/AAR) OTS price $7.60

Army Tropical Research Medical Lab., San Juan (Puerto Rico).
(No title).
Annual progress rept., 1 July 62-30 June 63.
30 June 63, 73p.
Unclassified report

Descriptors: (*Medicine, Reports). Ecology, Communicable diseases, Metabolism, Hematology, Nutrition, Histology, Schistosoma, Biology, Diseases, Medical research, Infections.

This report deals with various research projects in schistosomiasis and metabolism and nutrition. The areas covered in schistosomiasis include resistance, immunity, effects of ionizing radiation, physiology of infected animals, and molluscicides. In metabolism and nutrition the major emphasis is on gastro-intestinal function, histology, malabsorption, hematology and metabolic changes in malnutrition. Reports on acute diarrheas are also included, particularly dealing with etiology, epidemiology and physiology. (Author)

AD-412 730 Div. 16
(TISTB/AAR) OTS price $1.25

New York Eye and Ear Infirmary, N. Y.
THE EFFECTS OF THERMAL ENERGY ON ANTERIOR OCULAR TISSUES.
Final rept.,
by Jerry Hart Jacobson, Blossom Cooper, Harold W. Najac, and August Kohtiao. June 63, 39p.
Contract AF33 657 7894, Proj. 6301, Task 630103
AMRL TDR63 53 Unclassified report

Report on Aerospace Systems Personnel Protection.

Descriptors: (*Thermal radiation, Tissues (Biology)), (*Eye, Radiation effects), Rabbits, Pathology, Cornea, Energy, Dosage, Laboratory animals.

The eyes of pigmented, grey chinchilla rabbits were exposed to thermal energy to determine its effectiveness in producing pathological changes in anterior ocular tissues. The study included the variation of the following parameters: tissues, rate of delivery of energy, and spectral characteristics. Preliminary findings relative to damage to the cornea and iris are presented. (Author)

AD-412 765 Div. 16
(TISTB/AAR) OTS price $1.10

Harvard U. Medical School, Boston, Mass.
TISSUE TRANSPLANTATION. HOMOGRAFT ANTIGENS, IONIZING RADIATION AND OTHER FACTORS INFLUENCING HOMOGRAFT SURVIVAL.
Progress rept., 1 June 62-30 June 63,
by Gustave J. Dammin, J. Mackie Corson, Lewis T. Mann, Jr. and Thomas J. Gill, III. 30 June 63, 6p.
Contract DA49 193MD2061
Unclassified report

Descriptors: (*Transplantation, Effectiveness), Tissues, Skin, Spleen, Man, Dogs, Radiation effects, Kidneys, Antigens and antibodies, Survival, Preservation.

This report includes: The achievement of prolonged functional survival of renal homografts in man and the dog, transplantation of tissues and other whole organs (liver, spleen). Preservation of organs postmortem for ultimate transplantation; the isolation and characterization of cellular fractions active antigenically in a homologous system, synthetic polypeptides as model proteins, possible plasma expanders, and adjuvants for use with bacterial and viral antigens. (Author)

AD-412 779 Div. 16
(TISTM/RGR) OTS price $1.60

National Institutes of Health, Bethesda, Md.
DESIGN OF CLEAN ROOMS A CLASSIFIED LIST OF SE-

LECTED REFERENCES, 1955-1963.
comp. by Gertrude Fox. 1963, 15p.
Unclassified report

Descriptors: (*Research program administration, Bibliographies). (*Bibliogrphies, Research program administration). Design, Construction, Maintenance, Cleaning, Germ-free atmospheres, Contamination, Microorganisms, Processing.

The subject of clean room design, construction and maintenance has appeared in the literature only within the last decade. Requirements for components for the space program have resulted in rooms many times cleaner than the present day hospital operating room. The attention of health-research-oriented personnel has been drawn to the clean room problem, since solutions to the problem of achieving microscopically clean air may be applied to the design of surgical suites, sterile rooms, germfree animal quarters, virology, bacteriology and tissue culture laboratories, etc. Emphasis in compiling this list has been on the biomedical applications. (Author)

AD-412 782 Div. 16
(TISTB/WA) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SEASONAL VARIATIONS IN THE BLOOD VOLUME AND CIRCULATING METABOLITE LEVELS OF THE HUSKY DOG, by John P. Hannon and John L. Durrer. Mar 63, 8p.
Proj. 8237 02
AAL TDR62 53 Unclassified report

Descriptors: (*Blood circulation, Polar regions), Cold weather tests, Dogs, Low temperature research, Blood plasma, Blood proteins, Chemical analysis.

The total blood volumes of Alaskan Husky dogs continuously exposed out-of-doors in the sub-Arctic were approximately 25% greater in the winter than in the summer. This increase was the summated result of a 38% increase in total erythrocyte volume and a 14% increase in total plasma volume. Chemical analyses of the blood plasma showed large summer to winter increases in total lipids (44%) and phospholipids (40) and more moderate increases in plasma proteins (28%), cholesterol (24%) and nonprotein nitrogen (14%). (Author)

AD-412 814 Div. 16
(TISTB/JAB) OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
AN INSTRUMENT FOR VCG AND SCALAR ECG MEASUREMENTS.
Rept. no. 2,
by W. Carroll Hixson and Newton W. Allebach.
26 Mar 63, 17p.
Unclassified report

Descriptors: (*Electrocardiography, Measurement), Analysis, Blood circulation, Heart, Electrical properties, Galvanometers, Medicine, Surgery, Design.

An instrument was developed which displays the instantaneous electrical activity of the heart in either VCG loop form or in conventional scalar time-magnitude form with direction held constant. For the scalar representation, the instrument allows the electrophysical forces of the heart in any one of twelve equally spaced axes of the three orthogonal body reference planes to be displayed on a conventional time-amplitude ECG recorder. In addition, the instrument, utilizing commercially available preamplifiers which are compatible with other research equipments in use by this activity, permits the X, Y, and Z scalar signals derived from the Frank or similar VCG lead systems to be simultaneously displayed on a high frequency galvanometer recorder or stored for later computer analyses on a magnetic tape instrumentation recorder. (Author)

AD-412 818 Div. 16
(TISTB/AAR) OTS price $2.25

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
SYMPOSIUM ON MOTION SICKNESS WITH SPECIAL REFERENCE TO WEIGHTLESSNESS.
Final rept.
June 63, 80p.
Proj. 7184, Task 718405
AMRL TDR63 25 Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: (*Motion sickness, Symposia), Weightlessness, Therapy, Theory, Gravity (Artificial), Perception, Aircraft.

This report compiles the papers prepared for the symposium on motion sickness during a weightless state held at the Behavioral Sciences Laboratory, Aerospace Medical Laboratory, Wright-Patterson AFB in March 1960. Motion sickness is defined, its etiology is discussed, and proposals for prophylaxis and treatment are made. It contains a panel discussion among the principal contributors of the symposium, a theoretical study and two papers dealing with personal experiences in weightlessness. The high incidence of nausea occurring in the zero-G flights was suspected to be largely due to the excessive accelerations occurring in the pre- and post-zero-G periods accompanying these flights. Evidence to date indicated that weightlessness by itself was not nauseating, however, rapid head movements in the environment could rapidly produce disturbing influences. (Author)

AD-412 822 Div. 16
(TISTB/AAR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IN THE AIR HOVERS A CAT (WEIGHTLESSNESS EXPERIMENTS),
by L. Kitayev-Smyk. 11 June 63, 8p.
FTD TT63 618 Unclassified report

Trans. from Nauka i Zhisn, no. 4, pp. 35-39, 1963.

Descriptors: (*Weightlessness, Scientific research), Man, Animals, Fishes, Birds, Mice, Rats, Rabbits, Laboratory animals, Cats, Dogs.

AD-412 828 Div. 16
(TISTB/AAR) OTS price $1.10

Baylor U., Coll. of Medicine, Houston, Tex.
EXPERIMENTAL AND CLINICAL INVESTIGATIONS IN THE MANAGEMENT OF TRAUMA AND SHOCK.
Rept. for 1 Nov 62-30 July 63,
by Arthur C. Beall, Jr., Michael E. DeBakey and O. Brewster Harrington. 1963, 10p.
Contract DA49 007md564
Unclassified report

Descriptors: (*Shock, Scientific research), Shock therapy, Cardiovascular system, Liver, Wounds and injuries, Surgery, Blood circulation, Infections, Blood vessels.

Investigations have been carried out to determine ideal methods of managing cardiovascular trauma, particularly penetrating wounds of the carotid arteries, arteriovenous fistulas, and vascular injuries associated with musculoskeletal trauma. Additional studies were performed evaluating and attempting to improve methods of managing penetrating wounds of the neck, traumatic injuries of the liver, and injuries of the colon. Studies in regard to changes in coronary blood flow and cardiac output in the presence of hemorrhagic shock were completed. Animal investigations were instituted in order to determine the ideal arterial replacement graft for use in the presence of infection or anticipated infection associated with massive soft tissue damage. Grafts of knitted, crimped polypropylene appear to be well tolerated in infected areas; however, tissue fixation of these grafts is poor and long term evaluation demonstrates them to be inadequate as arterial replacement grafts. Investigations were also instituted in order to evaluate the use of autogenous veins as arterial replacement grafts under similar cirucmstances. One problem related to this appears to be whether or not autogenous veins maintain viability when used as arterial replacement grafts. The metabolic rate of such grafts was found to be insufficient for determination by Warburg technic; therefore, attempts will be made to determine this fact by use of the Polarograph. (Author)

AD-412 960 Div. 16
(TISTB/AAR) OTS price $4.60

BioTechnology, Inc., Falls Church, Va.
VISUAL IMPAIRMENT FROM EXPOSURE TO HIGH INTENSITY LIGHT SOURCES,
by James F. Parker, Jr. May 63, 39p. Rept. no. 63 2
Contract Nonr402200
Unclassified report

Descriptors: (*Blindness, Light), (*Vision, Inhibition), Intensity, Visual acuity, Radiation effects, Radiation injuries, Solar radiation, Eye, Illumination, Thermal radiation, Flashblindness.

AD-412 970 Div. 16
(TISTB/AAR) OTS price $9.10

Fordham U., New York.
SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS. SERIES II. NO. 1,
by Robert Pollitzer. Apr 63, 1v.
Contract DA18 108 405cm1867
Unclassified report

Descriptors: (*Abstracts, Medicine), (*Diseases), Medical research, Scientific research, Pathology, Public health.

AD-413 043 Div. 16
(TISTB/AAR) OTS price $1.60

Columbia U., New York.
INBRED GENETIC LOADS AND THE DETERMINATION OF POPULATION STRUCTURE,
by Howard Levene. 16 July 63, 13p. Rept. no. CU67 63Nonr266 33MS
Contract Nonr26633, Proj. NR042 034
Unclassified report

Descriptors: (*Population, Genetics), (*Genetics, Population), Determination, Statistical analysis, Mathematical analysis.

AD-413 075 Div. 16
(TISTB/AAR) OTS price $8.10

Research Triangle Inst., Durham, N. C.
EMERGENCY HEALTH PROBLEMS STUDY, VOLUME I. Final rept.,
by W. T. Herzog. 31 July 63, 1v.
Contract OCD OS62 250, OCD Proj. 2411A
Unclassified report

Descriptors: (*Public health, Shelters), Survival, Medicine, Drugs, Medical supplies, Diseases, Population, Casualties.

The peacetime health status of the population and the range of complications due to shelter living were evaluated. Rough estimates suggest that medical care and public health measures could add a number of survivors equal to 1 - 2 percent of the total preattack population during a single two-week period under ideal conditions. Post-attack medical care of casualties would not seriously compete with measures directed toward health maintenance of the general population, except for consumable medical supplies. Because casualty care and health maintenance of non-casualties are capable of adding comparable numbers of survivors during the shelter period (a maximum of 2 percent of the preattack population for either type of emphasis), it is concluded that both approaches should be emphasized. The available data on chronic, non-communicable diseases is sufficient to allow more quantitative stockpile planning of medical items for these conditions in shelters. Further research will be necessary before this is true for communicable diseases, because of the complexity of disease spread during shelter confinement. A method for optimizing the allocation of drugs for support of non-communicable chronic and acute conditions to shelters in a stockpiling program is suggested and illustrated by an example. (Author)

AD-413 118 Div. 16
(TISTB/AAR) OTS price $3.60

Pennsylvania Hospital, Philadelphia.
(No title).
Annual comprehensive rept.
Aug 63, 32p.
Contract DA18 108cm16652
Unclassified report

Descriptors: (*Neurology, Surgery), (*Surgery, Neurology), Scientific research, Primates, Brain, Stimulation, Cerebral cortex, Cats, Freezing.

AD-413 137 Div. 16
(TISTB/AAR) OTS price $1.60

Army Biological Labs., Frederick, Md.
IONIZING RADIATION IN THE PRODUCTION OF BACTERIAL PREPARATIONS.
26 Apr 63, 13p. Trans. no. 776
Unclassified report

Trans. from Meditsinskaya Radiologiya (Medical Radiology), 2:5, pp. 80-88, 1957.

Descriptors: (*Bacteria, Preparation), (*Radiation effects, Bacteria), Microorganisms, Epidemiology, Preservation, Electron microscopy, X rays.

AD-413 276 Div. 16
(TISTB/AAR) OTS price $9.60

California U., Berkeley, Coll. of Engineering and School of Public Health.
MICROBIOLOGICAL WASTE CONVERSION IN CONTROL OF ISOLATED ENVIRONMENTS.
Annual rept. no. 3,
by C. G. Golueke, J. W. Brewer, H. K. Gee, and W. J. Oswald. 28 Feb 63, 104p. SERL rept. no. 63 6
Contract AF19 604 6637, Proj. 6694, Task no. 66943
AFCRL 63 469 Unclassified report

Descriptors: (*Wastes (Sanitary engineering), Microorganisms), (*Algae, Energy conversion), Sanitary engineering, Light, Design, Culture, Ecology, Nitrogen, Closed-cycle ecological systems, Nutrition, Photosynthesis, Carbon dioxide.

In studies on the optimization of variables concerned with yield and with the over-all visible energy conversion efficiency of algae. The report shows that the geometric arrangement of the light source is an important factor. Experiments involving the use of a culture sshow that yield is greatest when the culture is illuminated bilaterally with globular, incandescent lamps arranged so that no two are directly opposite each other. The difference in yield is probbly a function of length of sojourn of the average algal cell in light and dark zones. The effect of depth and detention period on the extent of permissible loading of the algal culture in the Microterella was determined. Experiments on design and operation of specialized waste-treatment units were conducted. A new Microterella was built. The new unit i for experimentation on closed systems of the Mictoterella type that are directly toward eventual application on a man-scale unit. It principal limitation is that it can only accommodate a small animal, and not a man. (Author)

AD-413 294 Div. 16
(TISTB/AAR) OTS price $11.00

New York U. Coll. of Medicine, N. Y.
A STUDY OF LENTICULAR IMPERFECTIONS IN THE EYES OF A SAMPLE OF MICROWAVE WORKERS AND A CONTROL POPULATION.
Final rept.,
by Milton M. Zaret, Stephen F. Cleary, Bernard Pasternack, Merril Eisenbud, and Herbert Schmidt. 15 Mar 63, 33p.
Contract AF30 602 2215
RADC TDR63 125 Unclassified report

Descriptors: (*Eye, Radiation effects), Microwaves, Safety, Opthalmology, Vision, Aging, Ecology, Personnel.

An investigation was performed to compare the frequency of occurrence of lenticular imperfections in the eyes of a sample of 736 microwave workers and a control sample of size 559. The installations surveyed are described and their microwave safety procedures reviewed. The methodology for the ophthalmological examination, and for recording the extent of lens imperfections, are presented. Microwave exposure was estimated by analysis of occupational history questionnaires. Ophthalmological observations of special clinical significance are presented and findings of this investigation are discussed. (Author)

AD-413 297 Div. 16, 23
(TISTB/AAR) OTS price $23.50

School of Aerospace Medicine, Brooks Air Force Base, Tex.
LECTURES IN AEROSPACE MEDICINE -- 4 THRU 8 FEBRUARY 1963.
1963, 455p.
Unclassified report

Descriptors: (*Space medicine, Training), Man, Space flight, Human engineering, Guided missiles, Performance tests, Monitors, Life support, Manned, Wastes (Sanitary engineering), Shielding, Astronautics, Ecology, Physiology.

AD-413 325 Div. 16
(TISTM/RGR) OTS price $2.60

Birmingham U. (Gt. Brit.).
PROTEIN ABSORPTION IN SPRUE.
Final rept., 30 Nov 61-29 Nov 62.
1962, 23p.
Contract DA91 591EUC2046 1962
Unclassified report

Descriptors: (*Deficiency diseases, Absorption (Biological)), (*Absorption (Biological), Proteins), (*Proteins, Absorption (Biological)), Yeasts, Labeled substances, Nitrogen, Isotopes, Pancreas.

Four patients with adult coeliac disease and 4 patients with pancreatic insufficiency of ablation have been studied. The rate of absorption of yeast protein labelled with N-15 was followed by utilising knowledge previously obtained, that the rate of excretion of N-15 in the urinary ammonia and urea reflected the rate at which labelled materials entered the blood stream. (Author)

AD-413 411 Div. 16
(TISTB/AAR) OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. COORDINATE INDEX. PART II FOR ACCESSION LISTS FROM JULY 1, 1962 TO JULY 31, 1963.
15 Aug 63, 1v.
Unclassified report

Descriptors: (*Radiation effects, Indexes), Protons, Electrons, Gamma rays, Neutrons, Ultraviolet radiation, Electromagnetic waves, Thermal radiation, X-rays.

AD-413 456 Div. 16
(TISTB/AAR) OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
OBSERVATIONS ON THE ELICITATION OF SECONDARY AND INVERTED PRIMARY NYSTAGMUS FROM THE CAT BY UNILATERAL CALORIC IRRIGATION,
by William E. Collins. Feb 63, 11p.
CARI Rept. no. 63 3 Unclassified report

Descriptors: (*Sensory mechanisms, Psychology), (*Eye, Motion), Cats, Behavior, Stimulation, Reflexes, Ear.

Vestibular stimulation by repeated unilateral caloric irrigation of cats occasioned the appearance of secondary, tertiary, and inverted primary nystagmus in some animals. These inverse responses were recorded with stimulus temperatures of 5, 23.5, and 53.5 C, applied for durations ranging from 15-35 seconds. The inverse reaction most frequently obtained was the secondary nystagmus. Several possible explanations for the occurrence of the phenomena were examined. The findings appear related to ''habituation'' of the vestibular system, and thus have implications for vestibular adaptation in clinical situations and during air-vehicle maneuvers. (Author)

AD-413 478 Div. 16
(TISTB/AAR) OTS price $1.25

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
THE MECHANICAL IMPEDANCE OF THE HUMAN BODY IN SITTING AND STANDING POSITION AT LOW FREQUENCIES,
by Rolf R. Coermann. Sep 61, 39p.
Proj. 7231, Task 71786
ASD TR61 492 Unclassified report

Descriptors: (*Body, Stress (Physiology)), Theory, Measurement, Vibration, Motion, Human engineering, Posture, Man, Exposure, Analysis.

The theory of the mechanical impedance of systems with one or more degrees of freedom is applied to the human body. A method of measuring mechanical impedance and determining the parameters of the vibrating systems is developed. Impedance curves for longitudinal vibrations of a sitting and standing subject are established for the frequency range of 1 to 20 cps. The influence of varied posture and restraining systems is investigated. Dynamic movements of body parts are measured, directly or indirectly, and compared with the impedance curves. The responsible elements in the body for the apparent resonances are identified. Correlations between the impedance function of the body and the subjective tolerance curve to vibration are found and the reasons for the tolerance limits are elucidated. The variability of subjective tolerances due to varying posture, restraining systems, cushions, duration of exposure and vibrations are discussed, and conclusions for the development of protective devices are drawn. The correlation between the steady state response of the human body system and the effects of impact is discussed. (Author)

AD-413 485 Div. 16
(TISTB/AAR) OTS price $4.60

Linde Co., Div. of Union Carbide Corp., Tonawanda, N. Y.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD.
Bimonthly progress rept. no. 3, 1 May-1 July 63,
by A. P. Rinfret. 1 July 63, 42p.
Contract Nonr300300
Unclassified report

Descriptors: (*Blood, Preservation), Erythrocytes, Hemoglobin, Additives, Biochemistry, Physiology, Cells (Biology), Viability, Low temperature research.

This report summarizes studies on rapid and simple post-thaw separation procedures for the removal of PVP and hemoglobin from red cells; to improve the stability of red cells frozen and thawed in the presence of PVP; to obtain critical information on the clearance of PVP after infusion; and to search for additives that might be superior to PVP. (Author)

AD-413 489 Div. 16
(TISTB/AAR) OTS price $1.10

Walter Reed Army Inst. of Research, Washington, D. C.
THE EFFECT OF ANTIMETABOLITE THERAPY ON CHROMOSOME MORPHOLOGY OF BONE MARROW AND PERIPHERAL BLOOD LEUKOCYTES IN ACUTE LYMPHOCYTIC AND MYELOGENOUS LEUKEMIA.
Progress rept. Nov 62-July 63,
by Robert G. Scherz. July 63, 7p.
Proj. 6X97 87 001
Unclassified report

Descriptors: (*Leukemia, Therapy), Chromosomes, Morphology, Bone marrow, Lymphocytes, Metabolism, Blood, Analysis.

Chromosomal analyses were performed on specimens of peripheral blood leukocytes and bone marrow cells of two patients with acute lymphocytic leukemia. The modal counts and morphology before and after treatment with vincristine (2 mg/square meters/week) were indistinguishable from normal. Further studies are now in progress. (Author)

AD-413 492 Div. 16
(TISTB/WA) OTS price $1.10

Maryland U. Dental School, Baltimore.
ABSTRACT OF RESEARCH,
by Alvin F. Gardner. 1963, 5p.
Contract DA49 193Md2157
Unclassified report

Descriptors: (*Healing, Dentistry), Surgery, Teeth, Pathology, Bone, Anesthesia, Calification.

The findings in this investigation prove that bone can be induced to grow in a defect in the jaws which is of particular interest to dentistry and medicine. The BAPN-anorganic bone chips are ideal materials and represent a useful tool for further investigations of the process of osteogenesis. (Author)

AD-413 508 Div. 16
(TISTB/AAR) OTS price $1.10

Valley Forge General Hospital, Phoenixville, Pa.
RETURN OF MILITARY MEMBERS TO DUTY TO CONTINUE THERAPY, WHILE ON A DUTY STATUS, FOR PERIODS UP TO 12 MONTHS AND ANNUAL FOLLOW-UP FOR A MINIMUM OF FIVE YEARS AFTER COMPLETION OF CHEMOTHERAPY.
Annual progress rept., 1 July 62-30 June 63,
by William C. Hollifield and Joseph D. Di Mase.
30 June 63, 2p.
Proj. 6X97 87 001
Unclassified report

Descriptors: (*Diseases, Mycobacterium tuberculosis), Therapy, Drugs, Feasibility studies, Lungs.

This report presents results of the feasibility of a reasonably short period of hospitalization for military tuberculous patients and return them to duty on drugs for a period not to exceed twelve months. The military member returning to duty received PAS from this installation on a mail order basis. Other necessary drugs were obtained at their current duty stations. This was done to insure a fresh supply of PAS and also to serve as a check to insure that the patient was taking the prescribed drugs. To date 734 military members have been discharged to duty and only eight documented relapses have occurred. (Author)

AD-413 523 Div. 16
(TISTB/AAR) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE INFLUENCE OF AMBIENT TEMPERATURE ON THE RELATION BETWEEN SKIN TEMPERATURE AND BLOOD FLOW IN THE RABBIT EAR,
by N. Honda, L. D. Carlson and W. V. Judy.
Apr 63, 10p.
Contract AF41 657 335, Proj. 8237 02
AAL TDR62 45 Unclassified report

Descriptors: (*Environmental test, Blood circulation), (*Blood circulation, Environmental test), (*Body temperature, Ear), Temperature, Rabbits, Blood, Laboratory animals.

AD-413 650 Div. 16
(TISTB/AAR) OTS price $1.10

Goeteborg U. (Sweden).
RESEARCH ON INTRA NEURONAL MECHANISMS FOR INFORMATION STORAGE,
by Holger Hyden. 31 Mar 63, 7p. Technical rept. no. 1
Grant AF EOAR62 29
AFOSR Rept. no. 4845 Unclassified report

Descriptors: (*Learning, Biochemistry), (*Biochemistry, Learning), Enzymes, Adenosine phosphates, Cells, Stimulation, Rats, Respiration, Glycolysis, Energy, Proteins, Chemical reactions, Ribonucleic acids, Nerve cells.

This report describes microchemical and biophysical analyses of neurons and the glia surrounding each nerve cell body. The aid was to study, on the cellular level, the amount and composition of RNA, the amount of proteins, respiratory enzyme and ATP-ase activities during stimulation and in a learning situation in rats. Isolated, fresh cells were used for these studies. Inverse biochemical changes and result of kinetic studies showed that the neuron and its glia are linked in an energetic system. This inverse relationship between neuron and glia was shown to exist also with respect to RNA synthesis. The rate of the enzyme reactions increased by 100% in the neuron due to stimulation. The glia, however, did not change in that respect. The anaerobic glycolysis was shown to increase in glia and decrease in the neuron. This is supposed to reflect a priority of the neuron over the glia to get access to easily available energy through the respiratory chain, when the functional demands increase. (Author)

AD-413 670 Div. 16
(TISTB/AAR) OTS price $1.10

Pasadena Foundation for Medical Research, Calif.
CYTOLOGICAL ASPECTS OF INJURY AND REPAIR.
Annual progress rept. 1 Aug 62-28 May 63,
by C. M. Pomerat. 28 May 63, 8p.
Grant DA MD 49 193 63 G80
Unclassified report

Descriptors: (*Anesthesia, Cells (Biology)), Culture, Water, Liver, Tissue extracts, Reproduction (Physiology), Physiology, Staphlococcus, Wounds and injuries, Toxins and antitoxins, Cytochemistry.

Studies on the effect of anesthetics on clusters of human tracheal epithelial cells were extended to lesions in the intracellular environment. Considerable progress was made in the cultivation of cells from dental pulp and membrane behavior of the KB cell line. Additional facts were accumulated regarding the mechanism of Actinomycin on mitosis. The anti-inflammatory properties of a water insoluble liver extract as well as organic and inorganic selenium were studied with experimentally produced granuloma pouches. New attacks were made in the study of injury and repair following the treatment of cells with staphylococcus and tetanus toxins. Efforts to demonstrate a possible relation between Bence Jones protein and neutral mechanisms thus far have not been successful. The cultivation of endothelial cells and of epithelial systems from the lining of the female reproductive system following their disaggregation with trypsin led to two publications which point the way for further explorations in the physiology of cardiovascular structures and of all hollow organs. (Author)

AD-413 762 Div. 16
(TISTB/AAR) OTS price $2.60

London U. (Gt. Brit.)
CHEMICAL FACTORS IN THE EXCITATION OF CEREBRAL TISSUES.
Final technical rept.,
by Henry McIlwain. May 63, 16p.
AF EOAR Grant 62 4
Unclassified report

Descriptors: (*Brain, Tissues), (*Cerebral cortex, Excitation), Chemicals, Chemical compounds, Biochemistry, Stimulation, Membranes (Biology), Respiration, Nerve cells, Sodium, Potassium.

Mammalian cerebral tissues, electrically stimulated during incubation in isolation, showed a number of coordinated metabolic and electrical changes. Their respiratory rates increased in fashions which were quantitatively related to the duration, frequency, and potential of the stimulating pulses applied. Corresponding increase in movements of Na and K took place. Under limiting conditions these were of 5 to 6 micron equiv./g. tissue/applied pulse, and in active ion movement implied ratios of Na extruded:O utilized of 1.7, values which were compared with those derived in nonmammalian systems. Membrane potentials in cellular elements of the tissue diminished on stimulation and subsequently recovered; the time-course of diminution and recovery was directly connected with the concomitant ion movement. Chlorpromazine, phenobarbitone and cocaine in concentrations involved in their actions as drugs, and also clupeine, affected both ion movements and membrane potentials of the stimulated tissue. They did so in fashions which were characteristic of the added substance. (Author)

AD-413 763 Div. 16
(TISTB/AAR) OTS price $1.60

Karolinska Inst., Stockholm (Sweden).
SYMPATHETIC VASODILATOR OUTFLOW.
Final technical rept.,
by Borje Uvnas. 29 Mar 63, 9p.
Contract AF61 052 502
AFOSR 4849 Unclassified report

Descriptors: (*Nerves, Excitation), (*Thalamus, Stimulation), Heart, Blood circulation, Musculoskeletal system, Inhibition, Blood vessels, Muscles, Arteries.

Excitation of the sympathetic vasodilator outflow by hypothalamic and medullary stimulation causes a concomitant increase of cardiac contractile force and of skeletal muscle blood flow indicating those effects being integral parts of the reaction pattern elicited by intracerebral activation of the sympathetic vasodilator system. Vasodilatation due to excitation of cholinergic vasodilator nerves produced a decrease in peripheral resistance amounting to about 70 percent of the decrease caused by metabolic vasodilatation. It is considered that vasodilator nerve activity produces an arteriolar dilatation whereas vasodilatation due to inhibition of vasoconstrictor nerve activity or following muscular contraction induces relaxation of smooth muscles in both arterioles and precapillary sphincters. (Author)

AD-413 764 Div. 16
(TISTB/AAR) OTS price $1.10

London U. (Gt. Brit.).
THE STUDY OF THE MECHANISM OF TRANSFORMATION OF PHYSICAL ENERGY INTO NERVE ACTIVITY IN THE INTERNAL EAR.
Final technical rept.,
by F. C. Ormerod. Feb 63, 7p.
Grants AF EOAR62 2 and AF EOAR30 63
AFOSR 4862 Unclassified report

Descriptors: (*Energy, Transformations), (*Nerves, Ear), Bats, Analysis, Sound, Animals, Signals, Morphology, Theory, Physiology, Anatomy.

Study of the structure of the cochlea of a number of small mammals revealed, in certain species of bats and of rodents, a number of variations which appear to be related to the somewhat unusual sound frequencies which they are able to detect, and which are not found in the ears of the majority of mammals. Serial sections of larynxes of many species of bats have shown notable modifications -- massive intrinsic and extrinsic musculature, large arytenoid cartilages and very slender vocal cords - concerned with production of very high frequency sounds. Further work was done on various aspects of beat-note hypothesis in echolocation. Sonograph analysis of tape recordings of call signals of bats and other animals was made and studied. Suggestion that cavities of skull act as resonant filters was confirmed by constructing models and obtaining identical responses. (Author)

AD-413 814 Div. 16
(TISTB/AAR) OTS price $1.60

George Washington U., Washington, D. C.
AUTO- AND CROSS-CORRELATION OF FOREBRAIN ELECTRICAL POTENTIALS EVOKED BY SENSORY AND OTHER INPUT.
Annual rept., 1 Sep 62-1 Aug 63,
by James W. Watts. 1 Aug 63, 5p.
Contract DA49 007md1006
Unclassified report

Descriptors: (*Brain, Electrical properties), (*Sensory mechanisms, Analysis), Computers, Wounds & injuries, Vision, Light, Adaptation (Physiology), Physiology, Psychology. Physics, Retina, Sleep, Electroencephalography.

A computer system which averages repetitive evoked potentials and which conducts a variety of other operations has been developed, assembled, and improved. The computer is used to investigate electrophysiological potentials and to conduct a series of mathematical and statistical operations. The apparatus is used in the study of normal and defective subjects. With it evoked potentials have been studied in patients with lesions in the visual system. In favorable cases post retinal and retinal lesions can be localized. With normal subjects the apparatus has been applied to basic studies of the visual system to obtain light adaptation data for comparison with psychophysics. It has also been used in a number of other projects which are concerned with the quality of the retinal image, vigilance, sleep and wakefulness, the EEG, and learning. New programs which greatly enhance its value continue to be developed. (Author)

AD-413 909 Div. 16
(TISTB/AAR) OTS price $2.60

Maryland U., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, EASTERN EUROPEAN AND CHINESE LITERATURE,
by George Anastos. 1963, 20p. Vol. 2, no. 6
Unclassified report

Descriptors: (*Diseases, Bibliographies), (*Spirochaetales, Bibliographies), Medicine, Arthropods, Protozoa, Rickettsiales, Viruses.

AD-413 972 Div. 16
(TISTB/AAR) OTS price $1.60

Gotenborg U. (Sweden).
FUNCTIONAL SIGNIFICANCE OF DRUG-INDUCED CHANGES IN BRAIN MONOAMINE LEVELS.
Final technical rept.,
by Arvid Carlsson. 10 Apr 63, 18p.
Grant AF EOAR61 44
AFOSR 4851 Unclassified report

Descriptors: (*Brain, Chemistry), (*Biochemistry, Brain), Organic compounds, Drugs, Inhibition, Enzymes, Synthesis, Nerves, Membranes.

The mechanism of monoaminergic (i.e. adrenergic, noradrenergic, dopaminergic, and serotonergic) transmission in general is discussed on the basis of observations on the effects of various agents (chiefly precursors and precursor analogs, inhibitors of enzymes responsible for synthesis and degradation of monoamines, and drugs interfering with storage and release). The storage granules (or vesicles) of the monoaminergic nerve terminals, in which the transmitter can be visualized under the fluorescence microscope by means of a new histochemical technique, appear to have a dual function, i.e. (a) to serve as a store of transmitter, and (b) to make newly synthesized transmitter available for release by membrane depolarization. The former function does not seem to be essential, since the store can be depleted without any disturbance of transmission. The latter function seems to be essential: block of the uptake mechanism of the granules by reserpine results in block of transmission. (Author)

AD-414 013 Div. 16
(TISTB/AAR) OTS price $1.60

Goettingen U., Germany.
APPLICATION OF ELECTROMAGNETIC FLOW METER TECHNIQUE IN MAN.
Final technical rept. P. 8, 1 June 62-31 May 63, by Klaus Thurau. 31 May 63, 17p.
Contract DA91 591EUC2448
Unclassified report

Descriptors: (*Blood circulation, Measurement), Blood pressure, Blood vessels, Physiology, Flow meters, Dogs, Man, Surgery.

Data show that mean flow rates and mean blood pressure in patients (without symptoms of ischemia during periods of rest) are essentially the same compared to a group without obstructed lesions. The stenotic segment expresses itself only as a damping factor, leading to typical changes in the characteristics of flow and pressure pattern. Normal patterns were reestablished approximately five minutes after opening a graft bypass. Peripheral hemodynamic insufficiencies which occur during exercise could be produced experimentally during the course of operation. The injection of vasodilatory drugs (prior to the insertion of a bypass graft) into the artery distal to the stenosis decreased vascular resistance to flow. Under this condition of increased blood flow deman, the stenosis became hemodynamically effective. A mean pressure gradient across the stenotic segment could now be demonstrated. The test was repeated after the graft was in place. When resistance to flow was decreased by the same amount, no gradient was detectable. The results of the effect of mannitol on renal blood flow given during operation are presented. (Author)

AD-414 014 Div. 16, 30
(TISTB/AAR) OTS price $2.60

General Precision, Inc., Glendale, Calif.
RESEARCH ON THE ANALOGICAL SIMULATION OF NEURAL BEHAVIOR.
Final rept., Mar 61-Mar 63.
Mar 63, 25p.
Contract AF49 638 1021.
AFOSR 4952 Unclassified report

Descriptors: (*Nerves, Networkks), (*Nervous system, Theory), (*Nerve cells, Models), Electronics, Analog systems, Bionics, Physiology, Simulation.

This report summarizes research focused on three major problem areas: (1) Nerve network theory; (2) Electronic models of the neuron; (3) Gas ion models of the neuron. The general objective of our research has been to advance knowledge of the information processing capabilities of neural systems. (Author)

AD-414 045 Div. 16
(TISTB/WA) OTS price $1.60

Istituto Superiore di Sanita (Italy).
EFFECT OF DRUGS ON CENTRAL NERVOUS SYSTEM NEURONES.
Final technical rept.,
by Vincenzo G. Longo. 1 July 63, 16p.
Contract AF61 052 399
AFOSR 5107
Unclassified report

Descriptors: (*Nervous system, CNS depressants), Scopolamine, Amphetamines, Lysergic acids, Physiology, Cerebral cortex, Electroencephalography.

The present report exposes the results obtained during an investigation on the effects of drugs on the electrical activity of single cortical neurones. During the couse of this investigation the following drugs were injected: eserine, scopolamine, amphetamine, tryptamine and lysergic acid diethylamide (LSD). Although it is not possible with the present limited data to arrive at any clear-cut conclusion, some comments and indications in regard to future development of the research are the following: (1) In the sensorimotor cortex there seems to be some layers that have many cells responding with increased firing rate after application of external stimuli; (2) Both eserine and amphetamine provoke an increase in firing of single neurones; and (3) The ''flattening of the EEG tracing provoked by tryptamine and LSD seems to be related, at least where it is concerned with the limbic cortex, with a diminution of cellular activity. (Author)

AD-414 065 Div. 16
(TISTB/WA) OTS price $1.10

Hammersmith Hospital, London (Gt. Brit.).
FACTORS MODIFYING THE ACTION OF NEUROMUSCULAR BLOCKING AGENTS.
Final technical rept. 1 Apr 62-31 Mar 63, by J. P. Payne. 31 Mar 63, 6p.
Contract DA91 591euc2247
Unclassified report

Descriptors: (*CNS depressants, Physiology), pH, Muscles, Drugs, Nervous system, Contraction.

The effect of pH on the action of a number of neuromuscular blocking agents has been studied in vitro by means of the frog rectus abdominis muscle and the rat diaphragm. Three different buffering mechanisms were used to change the pH. The most satisfactory results were obtained with tris (hydroxy methyl) amino methane hydrochloride (THAM). A serine - NaOH buffer was effective over a smaller pH range and carbon dioxide although effective enough in changing the pH had also a restricted range and furthermore had a specific depressant effect on muscle activity. It was shown that an increase in pH over the range 6.5 to 9.0 improved the response of the frog rectus to acetylcholine. A similar improved contracture was obtained under the same circumstances with suxamethonium and decamethonium. The blocking action of tubocurarine was shown to be enhanced when the pH was raised to 8.5 and above that of gallamine was reduced. No obvious explanation for this difference was found nor was there any explanation for the absence of change below pH 8.5. The blocking action of suxamethonium and decamethonium was modified in a more complex fashion. With both drugs enhancement and inhibition occurred when tested against acetylcholine. However, whatever the effect the action of acetylcholine was always greatest around a pH of 8.0. No significant effect was observed with the other drugs studied. (Author)

AD-414 084 Div. 16
(TISTB/WA) OTS price $3.60

Uppsala U. (Sweden).
RESEARCH ON THE GENESIS OF ACTION POTENTIAL IN

EXCITABLE TISSUES,
by Torsten Teorell. 1 Apr 63, 25p.
Contract AF61 052 363
AFOSR 4848 Unclassified report

Descriptors: (*Tissue (Biology), Excitation), (*Stimulation), Hydrostatic pressure, Permeability, Ions, Potassium, Sodium, Models (Simulation), Biophysics, Mathematical analysis, Analog systems, Nervous system.

This Report dealt with a biophysical formalism applicable to various phenomena of excitability as exposed by living tissues like the nerve axons etc. A quantitative excitability analog was presented in terms of voltage (E), current (I), and a P-factor, located in a membrane containing fixed ionic groups. A physical realisation of this formalism has been achieved in membrane experiments where electro-endosmosis plays an essential part (i.r. the membrane oscillator). In such systems the P-factor is identified as a hydrostatic pressure gradient, which is voltage dependent. However, in other systems the P-factor may be equivalent to any other variable that is correspondingly dependent on the electrical variables E and/or I. A convenient illustration of various excitability phenomena like triggering, spike oscillations, voltage-current characteristics, voltage clamp etc. is possible in a three-dimensional model with the system variables E, I and P as coordinate axes. The introduction of the third system variable P, introduces negative electrical resistance in this excitability analog (i.e. the electrohydraulic nerve analog), which allows a rational interpretation of various instability phenomena, including ''mechano-electrical transduction. Examples was presented with references to corresponding physiological observations on nerves and other excitable objects, in particular Nitella cells. (Author)

17. METALLURGY

AD-411 766 Div. 17, 25
(TISTM/BRW) OTS price $2.75

Manufacturing Labs., Inc., Cambridge, Mass.
METALLURGICAL VARIABLES AFFECTING FRACTURE TOUGHNESS IN HIGH-STRENGTH SHEET ALLOYS.
Rept. for 15 Mar 61-14 Sep 62,
by C. E. Hartbower and G. M. Orner. June 63, 127p.
Contract AF33 616 8155, Proj. 7381, Task 738103
ASD TDR62 868 Unclassified report

Report on Materials Application.

Descriptors: (*Steel, Toughness), (*Fracture (Mechanics), Steel), Sheets, Stainless steel, Heat treatment, Austenite, Martensite, Bainite, Temperature, Deformation, Aging (Materials), Welding, Microstructure, Carbides, Transformations, Cold-working, Metallography.

Using precracked Charpy tests supplemented by center-notched tensile tests, the fracture toughness of five low-alloy and three stainless steel high-strength alloys in sheet form was measured primarily as a function of heat treatment variables such as austenitizing and tempering temperatures. The low alloy steels studied were D6AC (two heats), 4340 (martensitic and bainitic conditions), X200 (0.35 and 0.40% carbon), 300M and H11; and the stainless steels were AM 355, PH 15-7Mo and 301. For 4340, in the bainitic condition, the influence of subsequent deformation and aging on fracture toughness was also determined. In addition, preliminary studies of the effect of welding both before and after heat treatment on the toughness of H11, 300M and 4340 were carried out. (Author)

AD-411 781 Div. 17
(TISTM/BRW) OTS price $8.10

Auburn Research Foundation, Alabama Polytechnic Inst.
THE EFFECT OF THICKNESS AND TEMPERING TEMPERATURE ON FRACTURE APPEARANCE TRANSITION TEMPERATURE AND CRITICAL FRACTURE TOUGHNESS OF HIGH STRENGTH SHEET STEEL-PART I.
Final technical rept. no. 2,
by Hal W. Maynor, Jr. and Richard E. Mueller. 30 May 63, 12p.
Contract DA101 0090RD889
Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), (*Fractography, Steel), Thickness, Heat treatment, Temperature, Transition temperature, Toughness, Sheets, Brittleness, Quenching (Cooling), Ductility.

Fracture appearance transition temperature, FATT, of H-11 steel was observed to decrease nonlinearly with decreasing sheet thickness for yield strengths of approximately 160, 200 and 240 ksi. The effect of decreasing sheet thickness was relatively more pronounced in depressing FATT than was the effect of increasing tempering temperature. Phenomena consisting of gross pin-hole deformation or bearing failure, rupture through the pin-hole area, formation of steps of flat fracture and asymmetrical fracture topography, frequently were observed for fracture toughness specimens of 160-ksi yield strength. (Author)

AD-412 254 Div. 17, 26
(TISTM/AMS) OTS price $3.60

Aeon Labs. (Gt. Brit.).
THE PREPARATION OF THIN METAL FOILS BY MICROTOMY: AN ASSESSMENT OF THE TECHNIQUE, AND ITS APPLICATION TO METALLURGICAL INVESTIGATIONS WITH THE ELECTRON MICROSCOPE.
Final technical rept., 31 Dec 61-30 Mar 62,
by P. P. Dennis and I. S. Brammar. 22 Apr 63, 20p.
Contract DA91 591EUC1695
Unclassified report

Descriptors: (*Films, Electron microscopy), (*Electron microscopy, Films), (*Metallography, Foils), Aluminum alloys, Copper alloys, Silver alloys, Plastics, Brass, Stresses, Corrosion, Ammonia, Nickel, Plating, Iron, Zinc, Soldering alloys, Diffusion, Coatings, Copper compounds, Oxides, Cutting fluids, Electroplating, Electron microscopy, Deformation, Experimental data, Bonding, Metals, Alloys, Metal films, Material removal, Preparation.

Microtomy provides a suitable alternative method for preparing thin films of metallic specimens for electron microscopy, when electropolishing or etching techniques cannot be used, provided distortion is unimportant. Interfaces of metallic layers on a metal substrate can be prepared by microtomy provided there is strong bonding between the two materials. It is difficult to obtain sections of brittle oxide layers. The direct comparison between electropolished and microtomed thin films showed that the metallographic structure was similar, but some distortion of microtomed sections was inevitable. (Author)

AD-412 287 Div. 17, 25
(TISTM/BRW) OTS price $8.10

Israel Inst. of Tech. (Haifa).
DEPENDENCE OF THE STRENGTH OF METALS ON THE RATE OF STRAIN,
by Markus Reiner and David Abir. 15 Mar 63, 16p.
Contract AF61 052 304
ARL 63 122 Unclassified report

Descriptors: (*Metals, Mechanical properties), (*Loading (Mechanics), Velocity), Theory, Experimental data, Solids, Stresses, Deformation, Mathematical analysis, Tensile properties, Statics, Dynamics, Shear stresses, Solid state physics, Steel, Viscosity, Damping, Thermodynamics.

The thermodynamic theory of strength of a standard linear solid is specialized to the case of simple tension. Tensile experiments are carried out with four different kinds of mild steel at three different rates of loading. It is found that the coefficient of viscous damping decreases with increasing rate of loading. Both the yield stress and the yield strain increase with increasing rate of loading. (Author)

AD-412 293 Div. 17, 26
(TISTM/BRW) OTS price $2.60

Narmco Industries, Inc., San Diego, Calif.
THE INVESTIGATION OF EXOTHERMIC BRAZING OF REFRACTORY ALLOYS.
Quarterly rept. no. 2, 1 Feb-30 Apr 63,
by R. O. Banning, J. R. Armstrong, and R. A. Long. 28 May 63, 19p.
Contract N600 19 59237
Unclassified report

Descriptors: (*Heat resistant metals and alloys, Thermal joining), (*Thermal joining, Brazing), Soldering alloys, Nickel alloys, Manganese alloys, Molybdenum, Molybdenum alloys, Niobium, Tantalum, Tungsten, Titanium alloys, Zirconium alloys, Carbon alloys, Fluxes (Fusion), Ceramic materials, Heat.

Exothermic reactions (internal exotherms) that produce a braze alloy, a fluxing ceramic phase, and part of the heat required for brazing were investigated for brazing refractory metals. Acceptable joints were obtained with internal exotherms yielding a Ni-Mn braze alloy; however, those designed to yield a more refractory alloy (liquidus in excess of 3000 F) were not successful. Exothermic reactions (external exotherms) which act as a heat source were also investigated. Acceptable joints were obtained with W, Ta, Nb, Mo, and TZM alloy using braze filler alloys which melt at temperatures up to 3100 F. Data on the effect of the exothermic heating cycle on the various refractory base metals was obtained using tensile and microhardness evaluations as well as metallographic examination. (Author)

AD-412 460 Div. 17
(TISTM/AMS) OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal Ala.
THE TERNARY SYSTEM: ALUMINUM-MAGNESIUM-LITHIUM REPORT II. PHASE DIAGRAMS OF AUXILIARY CROSS SECTIONS,
by F. I. Shamray. 23 July 63, 14p.
RSIC 32 Unclassified report

Trans. from Izzvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk, no. 1, pp. 83-94, (1948).

Descriptors: (*Phase studies, Alloys), (*Alloys, Phase studies), Aluminum alloys, Magnesium alloys, Lithium alloys, Analysis, Microstructure.

In this investigation, auxiliary cross sections of the ternary system aluminum-magnesium-lithium through 5, 10, 15, 20, 30, 40, 50, and 60 atomic % lithium and the cross sections: Al_3Mg_4Al and $Al-Mg_2Li$ were studied by the methods of thermal analysis and microstructure. Phase diagrams of these auxiliary cross sections were constructed as a result of the investigation, and material was obtained to solve the problem of the phase diagram of the system Al-Mg-Li. (Author)

AD-412 465 Div. 17, 26
(TISTM/AMS) OTS price $1.10

Naval Research Lab., Washington, D. C.
FRACTOGRAPHY. PART XI. EXAMINATION OF 7075 I-6 ALUMINUM ALLOY FORGING FRACTURE,
by E. P. Dahlberg. June 63, 2p.
NRL Memo. rept. 1427 Unclassified report

Descriptors: (*Aluminum alloys, Fracture (Mechanics), Electron microscopy, Forging, Fracture (Mechanics), Fatigue, Stresses, Corrosion, Landing gear.

An intergranular fracture mode was observed by electron microscopy in the crack initiation region of the subject failure indicating that the fracture resulted from stress corrosion cracking. No evidence of mechanical fatigue crack propagation was observed. (Author)

AD-412 586 Div. 17
(TISTP/JP) OTS price $8.60

IIT Research Inst., Chicago, Ill.
HIGH TEMPERATURE PROPERTY STUDY FOR REENTERING NAP SYSTEMS.
Final rept., 1 Jan-31 Dec 62,
by J. C. Hedge, J. I. Lang, E. Howe, and R. Elliott. June 63, 91p. Rept. no. ARF A6003
Contract AF29 601 5012, Proj. 1831, Task 183101
AFSWC TDR63 17 Unclassified report

Descriptors: (*Uranium alloys, Physical properties), (*Zirconium alloys, Physical properties), Hydrides, Heat resistant metals & alloys, Heat of fusion, Thermal expansion, Thermal conductivity, Tensile properties, Emissivity, Oxidation, Dehydrogenation, Fracture (Mechanics).

The experimental determination of the properties of hydrided zirconium-uranium alloy is part of a larger program entitled "Nuclear Auxiliary Power System Re-entry and Disposal Phenomena." The following properties were determined over the temperature range from room temperature to 3260 degrees R: linear thermal expansion, thermal conductivity, specific heat, heat of fusion, heat of combustion, total normal emissivity, tensile strength, rate of hydrogen loss, rate of oxidation, and loss of fuel integrity at high heat flux. Rate of oxidation studies showed that when a hydrided zirconium-uranium alloy specimen was exposed to a temperature of 3010 degrees R in a furnace containing an air atmosphere, the specimen developed large fissures and broke into several smaller pieces. However, an actual hydrided zirconium-uranium fuel element rod exposed to a somewhat higher heat flux in an inert atmosphere developed several large cracks but did not break into smaller pieces. (Author)

AD-412 653 Div. 17
(TISTM/AMS) OTS price $1.60

Case Inst. of Tech., Cleveland, Ohio.
INTERFACE MOTION IN PHASE TRANSFORMATION. MORPHOLOGY OF BAINITE IN HYPOEUTECTOID STEELS,
by J. Oblak, R. H. Goodenow, and R. F. Hehemann. June 63, 5p. Technical rept. no. 1
Contract Nonr114115
Unclassified report

Descriptors: (*Bainite, Phase studies), (*Phase studies, Bainite), (*Grain structures (Metallurgy), Bainite), Metallography, Crystal structure, Martensite, Iron alloys, Carbon alloys, Steel, Microstructure.

A two surface metallographic technique has been used to study the morphology of upper and lower bainite in a series of low to medium alloy hypoeutectoid steels. Upper bainite (produced at 925 F) forms as long, thin needles or rods with an approximately rectangular cross section while lower bainite (produced at 575 F) forms as true plates. (Author)

AD-412 669 Div. 17
(TISTM/TCG) OTS price $1.60

New England Materials Lab., Inc., Medford, Mass.
HIGH TEMPERATURE DEFORMATION AND FRACTURE BEHAVIOR OF METALS UNDER HIGH STRAIN RATE CONDITIONS.
Progress rept. no. 1, 1 May-30 June 63,
by R. Widmer, J. M. Dhosi, and N. J. Grant.
Aug 63, 10p.
Contract NOw63 0502
19a
Unclassified report

Descriptors: (*Tungsten, Fracture (Mechanics)), (*Beryllium, Fracture (Mechanics)), (*Nickel alloys, Fracture (Mechanics)), (*Deformation, High temperature research), Stresses, Tensile properties, Ductility.

The purpose of the present investigation is to evaluate the high temperature deformation and fracture behavior of the following materials under high strain rate conditions: Udimet 500, W and Be. The strain rate dependance of the ductility as demonstrated with Udimet 700 has been found with several multi-phase materials. On the other hand, homogeneous single phase metals showed rather a continuous increase of the ductility with increasing strain rate. (Author)

AD-412 699 Div. 17
(TISTM/TCG) OTS price $3.60

Manufacturing Labs., Inc., Cambridge, Mass.
THERMOMECHANICAL TREATMENTS APPLIED TO ULTRAHIGH-STRENGTH BAINITIES.
Progress rept. no. 2, 15 Apr-15 July 63,
by D. Kalish and S. A. Kulin. 15 July 63, 31p.
Contract N600 19 59811
Unclassified report

Descriptors: (*Steel, Heat treatment), (*Mechanical working, Steel), (*Bainite, Transformations), Tensile properties, Deformation, Austenite, Microstructure, Quenching (Cooling), Elasticity, Stresses, Electron microscopy, Tool steel, Martensite.

The pertinent martensite and bainite transformation characteristics of 4350 and H11 were established. The tensile properties of H11 bainite were determined as a function of variou. processing parameters for selected thermal and thermomechanical treatments. A wide range of strength and ductility properties may be obtained by proper control of the treatment variables. The deformation of H11 bainite can develop a yield strength over 370,000 psi with an elongation of 2.3%. The formation of bainite out of deformed austenite produces an elongation of approximately 12% with yield strengths from 140,000 to 275,000 depending upon the treatment. The investigation was extended to similar treatments of 4350 and some results are presented. The microstructural changes resulting from the thermal and thermomechanical treatments are being studied by light and electron microscopy. (Author)

AD-412 791 Div. 17, 25
(TISTM/AMS) OTS price $2.60

Keck, W.M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
SOFT X-RAY SPECTROSCOPY OF IRON. COBALT. NICKEL AND SOME ALLOYS AND COMPOUNDS OF IRON.
by K. Das Gupta. June 63, 20p. TR 16
Contract Nonr 22030
Unclassified report

Descriptors: (*X-ray spectroscopy, Transition elements), (*Transition elements, X-ray spectroscopy), Density, Band spectrum, Aluminum, Iron alloys, Silicon alloys, Iron compounds, Silicon compounds, Silicon, Aluminum alloys, Phase studies, Copper alloys, Cobalt, Nickel, Vacuum, Crystals, Line spectrum, Single crystals, Mica, Gypsum, Experimental data.

The K and L spectra of aluminum, the K spectra of silicon in second order, and the L spectra of iron, cobalt, and nickel have been investigated in iron-aluminum and iron-silicon alloys. A bent crystal (mica and gypsum) and a ruled grating grazing incidence vacuum spectrograph have been used. A prominent new 3d band structure has been observed immediately on the short wavelength side of L alpha of iron in alloys. (Author)

AD-412 836 Div. 17, 14
(TISTM/AMS) OTS price $8.10

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Patricia B. Plate. July 63, 67p.
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Metals, Abstracts), (*Alloys, Abstracts), (*Materials, Abstracts), (*Bibliographies, Materials), Mechanical working, Mechanical properties, Physical properties, Heat treatment, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Magnesium, Silicon, Graphite, Composite materials, Refractory materials, Ceramic materials, Refractory metals and alloys, Niobium, Chromium, Molybdenum, Rhenium, Tantalum, Vanadium, Tungsten, Platinum, Coatings, Manufacturing methods.

AD-412 881 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIFFUSION OF SILICON IN TITANIUM, TANTALUM. MOLYBDENUM AND IRON,
by G. V. Samsonov and M. S. Koval'chenko.
19 June 63, 6p.
FTD TT63 262 Unclassified report

Trans from Ukrainian Periodical, Dopovidi Akademii Nauk Ukrains'koi RSR. Nr. 1, pp. 32-36, 1959.

Descriptors: (*Silicon, Diffusion), (*Silicides, Preparation), (*Metals, Silicides), Titanium, Titanium compounds, Tantalum, Tantalum compounds, Molybdenum, Molybdenum compounds, Iron, Iron compounds, Metallography, X-ray diffraction analysis, Hardness.

AD-412 885 Div. 17, 25
(TISTM/AMS) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONTEMPORARY PROBLEMS OF PHYSICAL METALLURGY.
2 July 63, 86p.
FTD TT63 510 Unclassified report

Trans. from Seriya: Metallovedeniye i Termicheskaya Obrabotka, pp. 1-61, 1962.

Descriptors: (*Metallurgy, Symposia), Fatigue (Mechanics), Fracture (Mechanics), Phase studies, Solid solutions, Transitional elements, Resistance (Electrical), Palladium alloys, Tungsten alloys, Molybdenum alloys, Electrical properties, Mechanical properties, Hardness, Wire, Heat treatment, Physical properties, Microstructure, Filaments, Crystal lattices, Cooling, Iron alloys, Nickel alloys, Decomposition, Chromium alloys, Copper alloys, Indium alloys, Zinc alloys, Creep, Steel, Alloys, Crystals, Ductility, Brittleness.

On May 9-11, 1961 a seminar was held at the Leningrad House of Scientific and Technical Propaganda concerning Contemporary Problems of Physical Metallurgy. At the seminar 14 reports, mostly summaries, were given, containing a number of new trends in the development of contemporary physical metallurgy. Some of the reports given at the seminar are published in the present brochure. (Author)

AD-412 900 Div. 17
(TISTM/BRW) OTS price $1.60

IIT Research Inst., Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 3, 13 Jan-12 Mar 63.
8 Apr 63, 14p. Rept. no. ARF B6001 B
Contract N600 19 59182
Unclassified report

Descriptors: (*Vanadium alloys, Refractory coatings), (*Niobium alloys, Coatings), Titanium alloys, Zirconium alloys, Carbon alloys, Tantalum alloys, Hafnium alloys, Tungsten alloys, Molybdenum alloys, Ruthenium alloys, Oxidation, Silicon, Silicides, Sodium compounds, Fluorides, Diffusion.

Basic pack siliconizing processing variables such as time, temperature, edge and surface preparation, activator concentration, and powder size are being investigated to optimize oxidation life and coating adherence for thin sheet material. Fifteen vanadium-columbium alloy compositions were pack siliconized and oxidation tested. Minimum life was established at about 150 hr at 2200 F for each of the alloys. (Author)

AD-412 903 Div. 17, 26
(TISTM/BRW) OTS price $2.60

Universal-Cyclops Steel Corporation, Bridgeville, Pa.
TUNGSTEN SHEET ROLLING PROGRAM.
Interim rept. no. 8, 1 May-31 July 63,
by W. J. Schoenfeld. Aug 63, 20p.
Contract AF33 600 41917
Unclassified report

Descriptors: (*Refractory metals and alloys, Tungsten), (*Tungsten, Material forming), Sheets, Rolling (Metallurgy), Melting, Electric arcs, Tensile properties, Pickling, Heat treatment.

Destructive and non-destructive evaluation of the 0.040- and 0.020-in. gage sheets was completed. Gage variation on the 0.020-in. sheets was slightly higher than desired although considered very good based on the 36-in. rolling width. Variation in tensile properties was considered excellent. (Author)

AD-412 904 Div. 17
(TISTM/BRW) OTS price $1.60

Climax Molybdenum Company of Michigan, Detroit.
STUDIES OF REFRACTORY ALLOY SHEET MATERIALS.
Quarterly rept. 15 Mar-15 June 63,
by Robert Q. Barr, Paul R. Pfefferle and M. Semchshen. 15 June 63, 9p.
Contract NOw 62 0419
Unclassified report

Descriptors: (*Refractory metals and alloys, Material forming), (*Tungsten alloys, Sheets), (*Molybdenum alloys, Sheets), Niobium alloys, Titanium alloys, Zirconium alloys, Carbon alloys, Extrusion, Heat treatment, Aging (Materials), Recrystallization, Hardness, Microstructure, Fractography.

The following alloys were consolidated by the vacuum-arc-casting process: (1) Mo + 1.59% Cb + 0.52% Ti + 0.21% Zr + 0.068% C, (2) Mo + 1.30% Ti + 0.35% Zr + 0.093% C, and (3) W + 3.10% Mo + 0.04% Zr + 0.001% C. Machined blanks from the ingots were extruded to rectangular bar form in preparation for rolling to sheet. The extruded bars were evaluated in terms of recrystallization behavior and response to solution and aging treatments. (Author)

AD-412 941 Div. 17
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHASE ANALYSIS OF SOME ALLOYS DIFFICULT TO FORM,
by N. I. Blok and N. F. Lashko. 17 June 63, 7p.
FTD TT63 479 Unclassified report

Trans. from Khimicheskiy Kontrol' Proizvodstva V Metallurgicheskoy I Metalloobrabatyvayushchey Promyshlennostii, Dnepropetrovskoye Knizhnoye Izdatel'stvo, pp. 246-250, 1960.

Descriptors: (*Nickel alloys, Chromium alloys), (*Phase studies, Nickel alloys), Aluminum alloys, Titanium alloys, Boron alloys, Molybdenum alloys, Tungsten alloys, Vanadium alloys, Carbon alloys, Solid solutions, Grain boundaries, Electrolytes, Separation, Chemical analysis, Carbides, Borides, Heat treatment, Aging (Materials), X-ray diffraction analysis, Alloys.

AD-413 042 Div. 17
(TISTM/BRW) OTS price $2.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
MOLYBDENUM SHEET ROLLING PROGRAM.
Interim rept. no. 21, 26 Apr 63-25 July 63.
25 July 63, 22p.
Contract NOas59 6142c
Unclassified report

Descriptors: (*Refractory metals and alloys, Material forming), (*Molybenum alloys, Rolling (Metallurgy)), Sheets, Titanium alloys, Zirconium alloys, Carbon alloys, Extrusion, Forging, Controlled atmospheres, Tensile properties, Mechanical properties, Microstructure.

This report details the work accomplished under Contract NOas 59-6142-c during the twenty-first reporting period. The remaining lot of Mo-0.5%Ti 0.60 in. sheet was tested, and the balance of the extrusion stock has been converted to 0.20 in. sheet. Five TZM ingots melted during the last period were extruded and an additional five ingots were melted and extruded this period. InFab forging of all Phase III material is approximately 80% complete and 75% of this is in various stages of rolling. (Author)

AD-413 120 Div. 17
(TISTM/BRW) OTS price $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY

BERYLLIUM.
Quarterly progress rept., 15 Apr-14 July 63,
by G. E. Spangler, M. Herman, E. J. Arndt, D. B. Hoover, and V. V. Damiano. 14 July 63, 32p.
Rept. no. Q B2089 2
Contract NOw63 0500
Unclassified report

Descriptors: (*Beryllium, Refining (Metallurgy)), (*Refining (Metallurgy), Zone melting), Beryllium alloys, Praseodymium, Recrystallization, Crystal structure, Hot working, Single crystals, Grain structure (Metallurgy), Crystal lattice defects, Fracture (Mechanics), Forging, Rolling (Metallurgy), Heat treatment, Brittleness, Ductility, Tensile properties, Electron microscopy, Foils, Copper alloys, Hardness, Diffusion, Deformation.

Contents: Zone refining; Zone melting; Automating device. Polycrystalline studies; Hot working studies; Hot swaging of zone refined beryllium; Hot forging and rolling of zone refined beryllium; Hot swaging of berylco powder rod; Hot swaging of SR grade Pechiney vacuum cast and extruded beryllium; Mechanical testing; Bend tests, Tensile tests. Electron microscopy; Surface studies; Thin film studies; Beryllium-copper alloy; Sub-boundaries and duplex slip. Self-diffusion in beryllium; Experimental results; Discussion.

AD-413 123 Div. 17
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF PROCESSING LIQUID (MOLTEN) METAL,
by L. A. Verte. 12 June 63, 4p.
FTD TT63 495 Unclassified report

Trans. from Russian Patent no. 141592 (Appl. no. 599092) pp. 1-2, 8 May 1958.

Descriptors: (*Metals, Refining (Metallurgy)), (*Refining (Metallurgy), Patents), Impurities, Flotation (Seperation), Electromagnetic fields.

AD-413 278 Div. 17, 25
(TISTM/AMS) OTS price $1.10

Ohio State U., Research Foundation, Columbus, Ohio.
SIZE EFFECT IN POLYCRYSTALLINE INDIUM PLATES IN A MAGNETIC FIELD.
Technical rept.,
by P. Cotti, J. L. Olsen, J. G. Daunt and M. Kreitman. Aug 63, 5p. TR9
Contract N6onr49520, Proj. NR018 412
Unclassified report

Descriptors: (*Indium, Magnetic properties), (*Magnetic properties, Indium), Magnetic fields, Resistance (Electrical), Metal films, Metal plates, Thickness, Electric currents, Crystals.

AD-413 459 Div. 17
(TISTM/BRW) OTS price $4.60

Hammond Metallurgical Lab., Yale U., New Haven, Conn.
ANALYSIS OF THE BROADENING OF POWER PATTERN PEAKS FROM COLD WORKED FCC AND BCC METALS,
by C. N. J. Wagner and E. N. Aqua. July 63, 1v. TR5
Contract Nonr60943
Unclassified report

Descriptors: (*Powder metals, X-ray diffraction analysis), (*Metals, Cold-working), Fourier analysis, Metallic crystals, Crystal structure, Crystal lattice defects, Deformation, Aluminum, Indium alloys, Silver alloys, Niobium, Tungsten, Particles, Strain (Mechanics).

Using CuK alpha radiation, the peak profiles of the cold worked and annealed filings of W, Nb, Al and Ag-In alloys were recorded with a standard focusing diffractometer. The Rachinger method was applied to separate the K alpha sub 1 and K alpha sub 2 peaks, and the K alpha sub 1 peaks were subjected to a Fourier analysis. Elimination of the instrumental broadening was carried out by the Stokes method which does not require any assumptions concerning the mathematical description of the diffraction peak profile. The Fourier coefficients were separated into the fractions produced by particle size and by strains by thw Warren-Averbach method. (Author)

AD-413 590 Div. 17, 27
(TISTM/BRW) OTS price $13.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATIONS IN THE STABILITY OF TURBINE VANE MATERIALS (Issledovaniye Prochnosti Materialov Lopatok Turbin),
by Ye. P. Unksov. 17 June 63, 168p.
FTD TT62 1817 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury, Moskva, pp. 1-167, 1961.

Descriptors: (*Turbine blades, Heat resistant metals and alloys), (*Heat resistant metals and alloys, Fatigue (Mechanics)), Steel, Creep, Models (Simulation), Austenite, Fractography, Grain structures (Metallurgy), Fracture (Mechanics), Stresses, Thermal stresses, Erosion, Test facilities, Test methods, Deformation, Mechanical properties, Strain gages, High temperature research.

This book presents the results of several projects undertaken at TsNIITMASH (Central Scientific Research Institute for Technology and Machine Building) to investigate durability in gas turbine vanes operating at high temperatures. Successive chapters are devoted to studies of vanes operating under simultaneous normal stress and variable deflection loads, to analysis of methods applied in measuring vibration strain, and to the construction of experimental equipment for these purposes. The collection is intended for engineers and technical workers in research organizzations, plant laboratories and turbine works, but it may be useful also for teachers at higher technical institutions. (Author)

AD-413 658 Div. 17
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEW THERMODIFFUSION DATA ON THE CHROMIUM-MOLYBDENUM SYSTEM,
by D. A. Prokoshkin and O. I. Sidunova. 12 May 63, 8p.
FTD TT 63 266 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy, Mashinostroyeniye, Nr. 5, pp. 101-105, 1960.

Descriptors: (*Molybdenum alloys, Diffusion), (*Chromium alloys, Diffusion), Solid solutions, Microstructure, Grain structures (Metallurgy), Hardness, Metallography, Molybdenum, Chromium, Plating, Phase studies, High temperature research.

In the diffusion of Cr into Mo at 1,400 C in a vacuum furnace phase recrystallization has been discovered through metallographic analysis. This is evidence of the fact that in the Cr-Mo system in the solid state there exists an area, previously not discovered, with a special structure and properties. The presence of the indicated area is confirmed also by other analyses. Thus Cr and Mo in the solid state do not form a continuous series of solid solutions as would be inferred from the literature on the subject. (Author)

AD-413 671 Div. 17
(TISTM/AMS) OTS price $7.60

National Research Corp., Cambridge, Mass.
THE INFLUENCE OF SURFACE PHENOMENA ON THE MECHANICAL PROPERTIES OF STRUCTURAL MATERIALS, (FATIGUE OF ALUMINUM IN VACUUM).
Final rept., 1 Jan 61-1 Jan 63,
by John L. Ham. Aug 63, 71p.
Contract AF49 638 1005, Proj. 9782, Task 37718
AFOSR Rept. no. 4860 Unclassified report

Descriptors: (*Aluminum, Fatigue (Mechanics)), (*Fatigue (Mechanics), Aluminum), (*Low pressure research, Aluminum), Vacuum, Metals, Controlled atmospheres, Sheets, Surface properties, Absorption, Pressure, Films, Test methods, Space environmental conditions, Protective treatments, Aluminum compounds, Oxides, Vacuum aparatus, Test equipment, Data, Vibration, Experimental data, Humidity, Ion bombardment, Microstructure, Tests, Copper, Steel, Argon.

Techniques were developed for evaluating the fatigue life of metals by reverse bending in controlled gaseous environments including high vacuum, and bombardment. These techniques were applied to electropolished specimens of commercially pure, half hard rolled aluminum sheet. The fatigue life of aluminum in reverse bending at 125 to 140 cycles per second was found to be about seven times longer in vacuum than in wet air and about four times longer in vacuum than in dry air. The cyclic strain causes more surface roughening in vacuum than in air. A hypothesis based on adsorption equilibrium and immunization to cracking by work hardening is proposed to explain the step change in life with pressure. The effectiveness of bombardment is ascribed to prevention of crack contamination by migration of mobile surface gas films. (Author)

AD-413 676 Div. 17, 25
(TISTM/BRW) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
ALUMINUM ANTIMONIDE. DATA SHEETS,
by M. Neuberger. Sep 62, 43p. Rept. no. DS110
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Aluminum alloys, Antimony alloys), (*Antimony alloys, Aluminum alloys), (*Semiconductors, Materials), Absorption spectrum, Impurities, Tellurium, Single crystals, Selenium, Dielectric properties, Crystals, Electrical conductance, Hall effect, Sulfur, Atomic energy levels, Radioactivity, Magnetostriction, Electron bombardment, Nuclear magnetic resonance, Decay schemes, Electrical properties, Magnetic properties, Photoelectric effect, Reflection, Photoconductivity, Refractive index, Resistance (Electrical), Thermoelectricity, Crystal lattice defects, Intermetallic compounds.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Aluminum Antimonide. (Author)

AD-413 745 Div. 17, 25
(TISTM/BRW) OTS price $1.60

Hughes Aircraft Co., Culver City, Calif.
SILICON: DIELECTRIC CONSTANT DATA SHEETS,
by M. Neuberger. Jan 63, 10p. Rept. no. DS119
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Silicon, Dielectric properties), (*Semiconductors, Silicon), Data, Single crystals, Crystals, Impurities, Gold, Temperature, Pressure, Electrical conductance, Microwave frequency.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Silicon: Dielectric Constant. (Author)

AD-413 746 Div. 17, 25
(TISTM/BRW) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
SILICON: ELECTRICAL CONDUCTIVITY DATA SHEETS,
by M. Neuberger. June 63, 21p. Rept. no. DS126
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Silicon, Electrical conductance), (*Semiconductors, Silicon), Data, Single crystals, Temperature, Electric fields, Impurities, Arsenic, Boron, Phosphorus, Thallium, Copper, Gold.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Silicon: Electrical Conductivity. (Author)

Division 17 - METALLURGY

AD-413 753 Div. 17
(TISTM/BRW) OTS price $2.60

Arde-Portland Inc., Paramus, N. J.
DEVELOPMENT OF HIGH-STRENGTH ALLOYS BY CRYOGENIC STRETCH-FORMING.
Quarterly technical rept. no. 1, 10 Apr-9 July 63, by M. S. Miller. 9 July 63, 18p.
Contract NOw63 0387c
Unclassified report

Descriptors: (*Stainless steel, Mechanical properties). (*Stretch forming, Cryogenics), (*Programming (Computers) Statistical analysis). Tensile properties, Austenite, Martensile, Transition temperature, Deformation.

Tensile test data were used as input information to an IBM computer program, in a multiple-regression analysis. The initial computer run was designed to obtain a prediction of room-temperature ultimate tensile strength based on chemistry. The computer analysis of 29 heats of 301 stainless steel revealed that additional variables were required in the input data to obtain a strong correlation. (Author)

AD-413 775 Div. 17, 25
(TISTM/BRW) OTS price $5.60

Hughes Aircraft Co., Culver City, Calif.
GALLIUM ANTIMONIDE. DATA SHEETS,
by M. Neuberger. Oct 62, 51p. Rept. no. DS112
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Intermetallic compounds, Electrical properties), (*Gallium alloys, Electrical properties), (*Antimony alloys, Electrical properties), Data, Absorption spectrum, Protons, Atomic energy levels, Magnetic properties, Dielectric properties, Diffusion, Resistance (Electric), Reflection, Crystal lattice defects, Electrical conductance, Impurities, Indium, Selenium, Semiconductors, Single crystals, Tellerium, Hall effect, Emissivity, Electron bombardment, Crystals, Photoelectric effect, Photoelectric effect, Photoconductivity, Piezoelectric effect, Refractive index, Thermal conductivity, Thermoelectricity.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Gallium Antimonide. (Author)

AD-413 832 Div. 17
(TISTM/BRW) OTS price $6.60

Technical U. of Berlin (Germany).
INVESTIGATION OF GRAIN GROWTH DURING THE RECRYSTALLIZATION OF IRON 3 PER CENT SILICON STEEL.
Final technical rept. 1 July 62-30 June 63, by Klaus Detert, Winfried Koehler and Gernot Fischer. 1v.
Contract DA91 591 EUC 2388
Unclassified report

Descriptors: (*Steel, Recrystallization), (*Grain structures (Metallurgy), Deformation), Strain (Mechanics), Aging (Materials), Cold-working, Silicon alloys, Iron alloys, Crystal substructure, Crystal lattice defects, Rolling (Metallurgy), Magnetic properties, Heat treatment, Hardness, Microstructure, Crystal structure, Magnetic alloys, Carbon, Stresses.

Grain oriented transformer sheet of Fe 3% Si were used for investigation of strain ageing, primary recrystallization and texture formation by primary recrystallization. Part of the material got special decarborizing treatment. So two strips of the same heat and the same history had a different carbon content of 0.008 and 0.004 per cent. (Author)

AD-413 892 Div. 17, 25
(TISTM/AMS) OTS price $4.60

Hughes Aircraft Co., Culver City, Calif.
INDIUM ARSENIDE, DATA SHEETS,
by M. Neuberger. July 62, 57p. Rept. no. DS109
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Indium alloys, Arsenic alloys), (*Arsenic alloys, Indium alloys), Semiconductors, Data, Absorption, Dielectric properties, Electrical conductance, Hall effect, Radiation damage, Life expectancy, Magnetic properties, Photoconductivity, Optical properties, Reflection, Refractive index, Resistance (Electrical), Thermal conductivity, Physical properties.

AD-413 932 Div. 17
(TISTM/BRW) OTS price $16.00

Manufacturing Labs., Inc., Cambridge, Mass.
SUBSTRUCTURE AND MECHANICAL PROPERTIES OF REFRACTORY METALS.
Final rept., 1 Apr 62-31 Mar 63,
by B. S. Lement, D. A. Thomas, S. Weissman, W. S. Owen, and P. B. Hirsch. Apr 63, 220p.
Contract AF33 657 8424, Proj. 7351, Task 735101
ASD TR61 181, pt. 3 Unclassified report

Descriptors: (*Refractory metals & alloys, Mechanical properties), (*Crystal substructure, Refractory metals & alloys), Molybdenum, Niobium, Tantalum, Tungsten, X-ray diffraction analysis, Electron microscopy, Fracture (Mechanics), Brittleness, Ductility, Grain structures (Metallurgy), Crystal lattice defects, Transition temperature, Internal friction.

A coordinated program on W, Mo, Ta and Cb was carried out by ManLabs, M. I. T., Rutgers, U. Liverpool (Eng.) and U. Cambridge (Eng.) by means of advanced microscopic, x-ray diffraction, and mechanical testing techniques. The effective surface energy for fracture of molybdenum strip was found to be about 3000 ergs/sq cm. The tensile ductility transition in Mo is associated with the occurrence of necking. Fibering in W involves formation of ribbon-like grains containing a dislocation cell structure in which fine platelets occur. Discontinuous yielding in Ta single crystals is correlated with a decrease in the shearing strain in the principal slip system to zero while that in the secondary system continues to increase. The binding energy between O atoms and dislocations in Ta is about 0.54 e.v. Dissociation of screw dislocations along three intersecting symmetrically located plates may account for the strong lattice friction stress in b.c.c. metals. (Author)

AD-413 955 Div. 17
(TISTM/BRW) OTS price $1.60

Vienna U., Austria.
INVESTIGATION OF THE EFFECTS OF ULTRASONICS ON THE DEFORMATION CHARACTERISTICS OF METALS.
Interim rept. no. 2, 1 May-31 July 63.
31 July 63, 10p.
Contract N62558 3436
Unclassified report

Descriptors: (*Ultrasonic radiation, Metals), (*Metallic crystals, Hardening), Deformation, Zinc, Strain (Mechanics), Shear stresses.

The effect of ultrasonic radiation on the behaviour of zinc crystals in static tensile tests are presented. The hardening through irradiation with ultrasonics of high energies, discovered by Langenecker, is being examined under a variety of experimental conditions. Increase of intensity and duration of irradiation brought stronger hardening. Straining previous to irradiation, decreases the hardening effect. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-412 431 Div. 18
(TISTA/FEM) OTS price $14.00

Radio Corp. of America, Bethesda, Md.
DETERMINATION OF PARAMETERS FOR RADIOLOGICAL PREDICTION AND MONITORING SYSTEMS,
by P. Reimers, C. Diehm, B. Holz, H. Kurkjian, and D. Hatheway. June 63, 1v.
Contract OCD OS62 140
Unclassified report

Descriptors: (*Radiation monitors, Gamma emission), (*Radiation measurement systems, Radiological contamination), (*Civil defense systems, Data transmission systems), Monitors, Automatic, Data, Protective coverings, Shelters, Radiation alarms, Costs, Reliability, Site selection, Radio communication systems, Telephone communication systems, Communication systems, Dosage, Instrumentation, Computers, Plotters, Command and control systems, Vulnerability, Weather stations, Mathematical prediction.

Design concepts and parameters are presented for two radiological monitoring systems; a Shelter-Based System, and an Automatic System. Gamma radiation intensities up to 1000 R/hr. are to be monitored. Recommended spacing of sensors is based on computer simulation of accuracies obtainable with various sensor spacings. Various combinations of instrument error, fallout pattern, probability of instrument malfunction, and orientations of the sensor network were used in these simulations. Initial costs and annual operating costs are estimated. (Author)

19. NAVIGATION

AD-411 758 Div. 19
(TISTE/JWS) OTS price $31.00

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NAVIGATION INSTRUMENTS,
by V. P. Seleznev. 3 June 63, 740p.
FTD TT62 1414 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, pp. 1-615, 1961.

Descriptors: (*Navigation, Textbooks), Navigation computers, Navigational aids, Celestial navigation, Doppler navigation, Inertial navigation, Radar navigation, Radio navigation, Space navigation, Instrumentation.

Some of the principles of aerial navigation, including problems in space navigation are presented. It contains an exposition of the theoretical principles and a description of the material means for aerial navigation and astronomic orientation relative to the earth and in interplanetary space. Particular attention is paid to unified course systems, to height-velocity central units, to Doppler velocity measuring instruments, different navigational automatic devices for path calculation and to astronomic orientation devices. The theoretical principles and the constructions of gyroscopic inertial, stellar-inertial, and complex navigation systems are given. (Author)

AD-412 273 Div. 19, 18, 6, 8
(TISTP/FEM) OTS price $2.60

Harry Diamond Labs., Washington, D. C.
RECEIVER OPTIMIZATION FOR A HEIGHT INDICATING SYSTEM,
by Peter B. Johnson. 26 June 63, 27p.
Grant DA1A222901A202, Proj. 26100
HDL TR1124 Unclassified report

Descriptors: (*Doppler radar, Guided missile warheads), (*Height finding, Continuous wave radar), (*Radar receivers, Optimization), Explosions, Timing devices, Detonators, Electronic equipment, Filters (Electromagnetic wave), Amplifiers, Automatic gain control, Radar signals, Noise (Radar), Signal-to-noise ratio, Low pass filters, Probability, Error, Performance (Engineering), Bandwidth, Computers.

A method is presented for determining an optimum set of parameters for a CW doppler radar receiver whose function is to give an output at a particular height above ground. The receiver consists of an input filter, amplifier with AGC, squared-law device, output filter, and threshold device. Optimization is achieved by establishing a figure of merit for the system and establishing that a best figure of merit can be found by variation of the receiver parameters. It is also shown that a knowledge of the magnitude of the input signal and noise is important for successful optimization. (Author)

Division 19 - NAVIGATION

AD-412 498 Div. 19
(TISTP/HSS) OTS price $5.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
OPTIMAL DOPPLER-INERTIAL SYSTEMS WITH TRANSIENT CONSTRAINTS,
by William A. Porter and Marshall Kuo. June 63, 46p. 2900 391 T
Contract DA36 039SC78801
Unclassified report

Report on Project MICHIGAN.

Descriptors: (*Inertial navigation, Doppler systems), (*Doppler navigation, Optimization), Doppler navigation, Transients, Optimization, Velocity, Radar navigation, Navigation.

Most statistically optimum doppler-inertial systems have, unfortunately, poor transient characteristics. To achieve near-optimal statistical performance with acceptable transient characteristics, the authors have carried out an optimization with a transient constraint. The results indicate that an attractive compromise between statistical and transient characteristics can be found for a large class of systems. (Author)

AD-412 527 Div. 19, 33
(TISTA/GEC) OTS price $2.60

Bendix Corp., Utica, N. Y.
DESIGN AND DEVELOPMENT OF THE MODULAR MONITOR SYSTEM INDICATORS.
Final rept.
May 63, 20p. Rept. no. P372R
Contract ARDS614, Proj. 113 14
Unclassified report

Descriptors: (*Navigational aids, Monitors). Display systems, Design, Malfunctions, Modules (Electronics). Airports.

The design and development was continued of a modular system to be used by airport Flight Service Stations for monitoring NAVAID equipment. The design objective has been to create equipment which can readily be adapted to the needs and growth of any Flight Service Station without waste of parts or space. During the design phase of the project, the contractor made studies of existing monitoring equipment and external wiring configurations. The modular design approach has been based upon separation of the functions common to all navigational facilities and the repetitive functions necessary for monitoring and control of each site. The repetitive functions are packaged into plug-in modules, each module representing one monitored equipment at a site. Reductions in equipment size were made possible by the introduction of smaller switch-indicators and semiconductor devices powered by a low voltage power supply. All components have been evaluated for performance and maintenance-free operation, and the final product thoroughly tested. (Author)

AD-413 072 Div. 19
(TISTE/AAR) OTS price $12.00

Coordinated Science Lab., U. of Illinois, Urbana.
MINIMIZING PRECESSION TORQUES IN THE ELECTRICALLY SUPPORTED GYRO,
by Don R. Allen. May 63, 149p. Rept. no. R165
Contract DA36 039sc85122
Unclassified report

Descriptors: (*Gyro compasses, Torque), Electricity, Electrodes, Displacement reactions, Servomechanisms.

AD-413 081 Div. 19
(TISTP/AW) OTS price $13.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NAVIGATION AND GYROSCOPIC DEVICES,
ed. by B. A. Ryabov. 7 June 63, 189p.
FTD TT63 473 Unclassified report

Trans. from Gosudarstvennoye Nauchno-tekhnicheskoye Izdatel'stvo Oborongiz, Moskva, 147:1-139, 1962.

Descriptors: (*Inertial navigation, Flight control systems), (*Gyroscopes, Flight control systems), (*Accelerometers, Flight control systems), Instrumentation, Navigation, Feedback, Errors, Circuits, Temperature, Automatic, Acceleration, Wiring diagrams, Theory.

Twelve articles examine the problems of measuring accelerations, calculating navigation accelerometers and their structural diagrams, calculating measuring systems with force compensation, as well as the theory of navigation systems and various gyroscopic instruments and devices. The collection is intended for aeronautical instrument engineers and technicians as well as for teachers and students of advanced courses of instrument building specialties at technical institutes of higher learning. (Author)

AD-413 339 Div. 19, 2
(TISTA/LSK) OTS price $5.60

Travelers Research Center, Inc., Hartford, Conn.
SPACE AND TIME VARIATIONS IN ATMOSPHERIC TRANSMISSION AT A RUNWAY.
Interim rept.,
by Keith D. Hage, Herbert D. Entrekin, and Albert E. Boyer, Jr. June 63, 52p. Technical publication 28
Contract FAA BRD363, Proj. 204 1
Unclassified report

Descriptors: (*Weather forecasting, All-weather aviation), (*Weather communications, All-weather aviation), (*Airplane landing, Visibility), (*Light transmission, Runways), Air traffic control systems, Air traffic, Airports, Terminal flight facilities, Fog, Rainfall, Snow, Climatology, Time, Scheduling.

The space and time variations in atmospheric transmission during fog, rain, snow, and blowing snow are examined in detail as a preliminary step in the development of suitable short-range prediction techniques of operational parameters for use at aviation terminals. The study is based primarily on selected samples of continuous data from four transmissometers alongside one runway at the Federal Aviation Agency, National Aviation Facilities Experimental Center at Atlantic City, N. J. Because of the limitations of station spacing and the 1-dimensional nature of the network, the results of the study are far from comprehensive. However, the data serve as a test for analysis techniques and as a starting point for the more complete investigations that will be made possible by the mesonetwork installation in the Atlantic City region. Within the limits noted, information is presented on characteristic space scales, local effects on the transmission field, and the movement and linear predictability of the transmission field. Some of the characteristic variability properties are interpreted in terms of concurrent hourly observations of wind, cloud cover, time of day, and precipitation. (Author)

AD-413 360 Div. 19, 1, 33
(TISTA/LSK) OTS price $4.60

Applied Psychology Corp., Arlington, Va.
CONSPICUITY OF TALL RADIO AND TELEVISION TOWERS IN MARGINAL VISUAL FLIGHT RULES WEATHER.
Final rept.
Jan 63, 39p.
Contract ARDS 431, Proj. 425 1R
Unclassified report

Descriptors: (*Radio towers, Lighting equipment), Television antennas, Antennas, Marker lights, Markers, Visibility, Identification, Aviation safety, Paints.

A comprehensive study was made of marking and lighting of tall radio and television antenna towers so as to be easily detectable by aircraft pilots flying in marginal Visual Flight Rules weather during the daytime. The research used a variety of methods including controlled flight observations and routine flight sightings of experimentally marked and lighted towers, reports of pilot experience with such towers, and scale-model tests of marking patterns. These studies are reported in detail, and recommendations are made for tower marking and lighting standards based on the findings and pertinent technical literature. The recommendations include requirements for at least three white lights of 100,000 to 200,000 candles flashing synchronously at 80-90 fpm. Marking should be with black and white bands 100 feet wide. Guy wire beacons and ground markings are considered to be optional features. (Author)

AD-413 983 Div. 19
(TISTA/FRL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATION IN COSMIC NAVIGATION,
by A. M. Letov. 26 July 63, 5p.
FTD TT 63 608 Unclassified report

Trans. from Nauka i Zhizn, Nr. 11, pp. 28-29, 1962.

Descriptors: (*Celestrial navigation, Spacecraft), Analysis, Inertial navigation.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-411 847 Div. 20, 8
(TISTP/RLG) OTS price $10.50

Radiation Effects Information Center, Columbus, Ohio.
REPORT ON RADIATION-EFFECTS STATE OF THE ART 1962-1963,
by D. J. Hamman, E. N. Wyler, W. E. Chapin, W. H. Veazie, Jr., and F. R. Shober. 30 June 63, 128p.
Rept. no. 28
Contract AF33 657 10085; AF33 616 7375, Proj. 7381; 7634, Task 738103
Unclassified report

Descriptors: Radiation damage, Reviews), Electronic equipment, Semiconductor devices, Semiconductors, Polymers, Materials, Fuels, Lubricants, Hydraulic fluids, Structural parts, Metals, Alloys, Ceramic materials, Space environmental conditions, Dose rate, Dosimeters, Electrical networks.

Generalized conclusions related to radiation effects on various materials, components, and systems include: (1) more experimental effort is still needed in studying combined effects of radiation and other environments. Of particular interest are the combination of radiation, extreme temperatures, and ultrahigh vacuum. In the ultrahigh-vacuum area the main interest should be concentrated on organic-materials. Although much is known concerning the loss of material due to evaporation and sublimation, very little is known concerning the effects of these material losses on the physical strength and electrical characteristics; (2) More research effort should be devoted to developing means for shielding materials, devices, and systems with known susceptibilities to radiation damage as a parallel effort, with research being conducted to increase resistance to radiation damage; and (3) More information is needed concerning the effects of space radiations on materials, devices, and components. (Author)

AD-411 882 Div. 20
(TISTP/RLG) OTS price $2.60

Aerospace Information Div., Washington, D. C.
SOVIET NUCLEAR RESEARCH REACTOR VVR-Ts.
Summary of Data.
3 July 63, 18p.
AID Report P63 88
Unclassified report

Descriptors: (*Research reactor, Design), Reactor lattice parameters, Test facilities, Reactor fuel elements, Reactor cores, Reactor shielding materials, Reactor control, Reactor safety systems, Beam power tubes, Thermal column, Construction.

A detailed description of the VVR-Ts research reactor, located in Alma-Ata is given. The presentation includes background information, design features, reactor parameters, and information on experimental facilities afforded by the reactor, together with illustrations and diagrams. The report is based on Soviet open literature available at the Aerospace Information Division and the Library of Congress. Any further information concerning this reactor will be published in the form of supplements to this report, as soon as it becomes available. A list of the references cited accompanies the test. (Author)

AD-411 944 Div. 20
(TISTP/RLG) OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 65. ABSTRACTS. PART I.
Rept. for 1-30 June 63.
15 July 63, 30p. Accession list 65
Contract AF33 657 10085, Proj. 7381 and 7634, Task 738103
Unclassified report

Descriptors: (*Radiation effects, Abstracts), Radiation damage, Bibliographies, Metals, Space environmental conditions, Ceramic materials, Polymers, Test equipment, Test methods, Test facilities, Organic materials, Materials, Electronic equipment, Indexes.

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-412 295 Div. 20
(TISTP/FEM) OTS $2.60

Keller Research Establishment (Norway).
MAGNETIC SCATTERING OF NEUTRONS.
Annual technical rept. no. 2, 1 Jan-31 Dec 62.
31 Dec 62, 1v.
Contract DA91 591euc2097
Unclassified report

Descriptors: (*Neutron scattering, Nuclear spins), (*Neutron beams, Polarization), Inelastic scattering, Neutrons, Spin, Magnetic, fields, Nuclear resonance, Monochromatic light, Crystals, Crystal structure, Oscillators, Coils, Frequency shift, Spectroscopy, Magnetometers.

A crystal spectrometer with f.c.c. cobalt crystals was used for producing a polarized, monoenergetic neutron beam. The polarizing efficiency of a number of crystals was tested and a maximum polarization of 0.975 ± 0.015 was measured. Magnetic guide-fields were shaped such as to give minimum depolarization. A nuclear magnetic resonance unit was constructed and found to flip the neutron spins with an efficiency of 99%, this number being measured with an accuracy of 2.5%. With f.c.c. cobalt crystals both in polarizing and analyzing positions a double reflection ratio better than 25 was measured. This number is deemed sufficiently high that the planned spin wave experiments with polarized neutrons may be started. Collective spin excitations in f.c.c. cobalt were studied by scattering of unpolarized neutrons. The shape and intensity of diffuse peaks of neutrons scattered inelastically after absorbing phonon and magnon energies of 2.44 meV, were studied in the temperature range from 300 to 900 degrees K. Some details of the two experimental setups are given. (Author)

AD-412 695 Div. 20, 25
(TISTP/MFA) OTS price $1.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE EFFECT OF QUADRUPOLE VIBRATIONS ON L-FORBIDDEN M1 TRANSITIONS,
by Raymond A. Sorensen. 19 July 63, 11p. Technical rept. no. 12
Contract Nonr76015, Proj. NR012 202
Unclassified report

Descriptors: (*Nuclear particles, Electron transitions), (*Quadrupole moments, Vibration), Nuclear models, Phonons, Quantum mechanics, Nucleons, Nickel, Xenon, Isotopes, Europium, Rubidium, Lanthanum, Praesodymium, Gold, Iridium, Antimony, Promethium, Thallium, Iodine, Nuclear spin.

The effect of quadrupole vibrations on l-forbidden M1 transitions is computed using the wave functions resulting from the shell model with a residual pairing pulse P(2) force. These wave functions for low states of an odd nucleus are a linear combination of a spin j quasi-particle and spin j' quasi-particles coupled to 2+ phonons to angular momentum j. The one-phonon components of the wave functions allow l-forbidden M1 transitions to proceed both via the single particle and collective M1 operators. The calculation shows that the quadrupole coupling can explain most of the observed transition rate in a number of cases, while in a few cases, particularly for the odd-N nuclei fast transitions occur which are still unexplained. In addition, it is shown that the E2 contribution to these transitions while expected to be enhanced to several times single particle in most cases, nevertheless usually makes only a very small contribution to the total rate. (Author)

AD-412 696 Div. 20
(TISTP/MFA) OTS price $1.10

Litton Systems, Inc., Woodland Hills, Calif.
(No title).
Progress rept. for July 63.
July 63, 4p.
Contract AF33 657 10584
Unclassified report

Descriptors: (*Preamplifiers, Oscillographs), (*Nuclear reactors, Tests), Radiation damage, Dosimeters, Radioactivity, Radiation measurement systems.

AD-412 732 Div. 20, 25
(TISTM/REB) OTS price $3.00

Westinghouse Electric Corp., Youngwood, Pa.
IMPROVED SOLID STATE RADIATION DETECTOR.
Final rept.,
by M. S. Shaikh, R. R. Feber, E. L. Keller and P. R. Malmberg. 22 Apr 63, 141p.
Contract OCDS OS62 70
Unclassified report

Descriptors: (*Gamma rays, Detection), (*Radiation measurement systems and components, Solid state physics), Silicon, Diodes (Semiconductors), Instrumentation, Manufacturing methods, Preamplifiers, Pulse amplifiers.

Silicon diode structures were investigated as solid state gamma radiation detectors. The specific areas of effort were: (1) To study and demonstrate the feasibility of utilization of a silicon P-N junction as a gamma-ray detector; (2) To study the attainable response characteristics of gamma-ray instrument which incorporates a silicon P-N junction as a sensing element; (3) To determine the best type or types of diode structure for use as a gamma-ray detector; and (4) To develop a solid state monitoring instrument (solid state detector diode plus associated instrument electronics) which will meet the general OCD instrument specifications. The investigation was quite successful in each of the areas. (Author)

AD-412 733 Div. 20
(TISTP/FEM) OTS price $13.00

United Research Services, Burlingame, Calif.
FEASIBILITY OF ACTIVE COUNTERMEASURES FOR THERMAL RADIATION EFFECTS OF NUCLEAR WEAPONS.
Final rept.,
by T. C. Goodale, M. B. Hawkins, A. B. Willoughby. July 63, 1v. 617 4
Contract OCD OS62 242
Unclassified report

Descriptors: (*Radiation effects, Countermeasures), (*Smoke screens, Thermal radiation), Nuclear explosions, Attenuation, Particles, Absorption, Costs, Wind, Scattering, Diffusion, Atmospheric motion.

The effectiveness and practicality of active countermeasures to the thermal effects of nuclear detonations were investigated. The use of smoke screens to attenuate the incident thermal radiation below damaging levels appeared to be the most practical countermeasures for large area application. The investigation included review of available information on active countermeasures; study of radiation attenuation by individual particles and clouds of particles; study of the theory of smoke-producing reactions; development of preliminary smoke-screen system design procedures; and preliminary cost-effectivess analyses of several candidate smoke-screen systems. (Author)

AD-412 743 Div. 20, 21, 7
(TISTA/LSK) OTS price $6.60

Vidya, Inc., Palo Alto, Calif.
THE RESPONSE OF NUCLEAR AUXILIARY POWER UNIT FUEL RODS TO SIMULATED RE-ENTRY HEATING.
Rept. for 1962,
by W. J. Fleming, Jr. and R. A. Rindal. May 63, 61p. Technical rept. no. 93
Contract AF29 601 5005, Proj. 1831, Task 183101
AFSWC TDR63 52 Unclassified report

Descriptors: (*Reactor fuel rods, Aerodynamic heating), (*Auxiliary power plants, Nuclear power plants), Atmosphere entry, Satellites (Artificial), Ablation, Zirconium alloys, Uranium alloys, Radioactive waste, Disposal, Liquids, Drops, Thermodynamics, Reactor fuel elements.

Experimental and analytical studies were conducted to determine the mechanisms and extent of material removal and/or accretion for hydrided nuclear auxiliary power unit fuel rod materials under conditions simulating exposure of fuel rods during re-entry from naturally decaying earth orbits. Evidence of material accretion through formation of oxides and nitrides was found even under conditions where measurable amounts of material were removed. Under initial heating conditions comparable with the highest heating level presently anticipated, no appreciable weight reductions were found even when the fuel rod surface was maintained at temperatures in excess of 3700 F for periods up to 60 seconds. Appreciable weight losses were found for initial heating conditions more severe than those presently anticipated. The distribution of sizes of recovered particles was determined in each case where significant material removal occurred. A mechanism of fuel rod material removal based on the results of these tests is suggested. (Author)

AD-412 858 Div. 20, 8
(TISTP/FEM) OTS price $3.60

Boeing Co., Seattle, Wash.
TRANSIENT RADIATION EFFECTS IN COAXIAL CABLES DUE TO GAMMA-NEUTRON RADIATION PULSES,
by H. W. Wicklein. 15 May 62, 37p. Document no. D2 90172
Unclassified report

Descriptors: (*Radiation effects, Coaxial cables), (*Coaxial cables, Radiation damage), Compton scattering, Secondary emission, Neutrons, Gamma emission, Transients, Nuclear reactors, Tests.

Geometry tests have been performed on RG-59B/U and RG-174/U coaxial cables at the Kukla pulsed reactor. It has been observed that the radiation-induced current from center conductor to grounded shield is described by a formula which is given. The responsible mechanisms are Compton scattering, ion pair generation, and secondary emission. (Author)

AD-413 033 Div. 20, 30
(TISTP/FEM) OTS price $5.60

Iowa State U., Iowa City.
ANALYSIS OF DATA TRACES OF VERY SHORT DURATION,
by James Hurt and Philip Francis. 20 May 63, 53p. Rept. no. 7
Contract DA11 070 5080RD1232, DA Proj. 517 01 002
Unclassified report

Descriptors: (*Data processing systems, Experimental data), (*Harmonic analysis, Data), (*Launching, Motion), Analysis, Correlation techniques, Frequency, Programming (Computers), Sequences, Matrix albegra, Statistical analysis, Probability, Radio frequency, Extremely low frequency, Band pass filters, Artillery, Modulation, Low pass filters, Computers.

An amplification is presented of methods presented in a previous report in which numerical methods were developed for finding and isolating the component parts of a transducer output. Two field data traces of unknown content are reduced to their fundamental harmonic components. A detailed discussion for each analysis is given, along with comparisons between the original traces and the approximate representations as deduced in the analysis. Each discussion is augmented with several graphs showing the progress of the reduction at each stage in the analysis. (Author)

AD-413 328 Div. 20
(TISTP/FEM) OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
RADIATION EFFECTS INFORMATION CENTER MONTHLY ACCESSION LIST ABSTRACTS, PART I.
15 Aug 63, 31p. Accession list 66
Contract AF33 657 10085 (Continuation of AF33 616 7375), Projs. 7381 and 7634, Task 738103
Unclassified report

Descriptors: (*Radiation effects, Abstracts), (*Radiation damage, Materials), Nuclear reactors, Environmental tests, Space environmental conditions, Ceramic materials, Polymers, Degradation, Ionization, Radiation monitors, Calorimeters, Dosimeters, Solar cells.

AD-413 496 Div. 20, 2
(TISTP/FEM) OTS price $1.25

Weather Bureau Research Station, Las Vegas, Nev.
WEATHER AND SURFACE RADIATION PREDICTION ACTIVITIES FOR PROJECT SEDAN.
Nov 62, 45p.
AEC PNE 201F Unclassified report

Descriptors: (*Nuclear explosions, Cratering), (*Weather forecasting, Radiation hazards), (*Weather stations, Radioactive fallout), Atmospheric pollution, Operation, Meteorological charts, Atmospheric motion, Air mass analysis, Wind, Barometric pressure, Meteorological parameters, Data, Temperature, Dew point, Humidity, Visibility, Dose rate.

The maintenance of a meterorological service at the Nevada Test Site with the capability of preparing and issuing forecasts of meteorological elements pertinent to test activities and estimates of possible radiation exposure resulting from test activities is reported. These forecasts were made available to the Test Manager and his Advisory Panel in formal briefings and informal discussions to assist in the evaluation of the problems associated with the test operation. A secondary responsibility is the analyses of meteorological and radiological data collected during the test operation. These analyses contribute to the scientific interpretation of the radiological exposure resulting from the test as well as forming a basis for improving forecasting techniques. (Author)

AD-413 869 Div. 20, 25
(TISTP/WH) OTS price $3.60

Cambridge Language Research Unit (Gt. Brit.).
A PRELIMINARY INTERPRETATION OF MASS,
by E. W. Bastin and C. W. Kilmister. Feb 63,
32p. ISU10
Contract AF61 052 331
AFOSR 5049 Unclassified report

Descriptors: (*Nuclear particles, Physical properties), (*Decay schemes, Mathematical models), Atomic structure, Algebra, Matrix algebra, Vector analysis, Protons, Electrons.

An I.S.U. 7 in algebraic hierarchy was formulated by A. F. Parker-Rhodes without any physical interpretation. We assume now that particular hierarchy of His general type corresponds to a proton or an electron in certain circumstances -- the whole hierarchy being necessary to represent the whole complex of observations of it. The present paper starts from this assumption and in it we apply constraints to the process of hierarchy construction in such a way that we can decompose hierarchy into 2 independent parts for the purpose of representing unstable particles that disintegrate into at least 2 decay products. (Author)

AD-414 017 Div. 20, 25
(TISTP/MFA) OTS price $1.60

Stanford U., Calif.
NUCLEI, HYPERNUCLEI, AND THE EIGHTFOLD WAY,
by Robert J. Oakes. Apr 63, 12p.
Contract AF49 638 388
AFOSR 4948 Unclassified report

Descriptors: (*Baryons, Nuclei), (*Nuclear spins, Analysis), Theory, Transformations (Mathematics), Parity, Deuterons, Isotopes, Helium, Symmetry (Crystallography).

AD-414 033 Div. 20, 30
(TISTE/OHD) OTS price $3.60

Boeing Co., Seattle, Wash.
BOEING RADIATION EFFECTS LABORATORY.
3 Jan 63, 27p. Document no. D2 90241
Unclassified report

Descriptors: (*Radiation damage, Laboratories), (*Laboratories, Radiation damage), Linear accelerators, Klystrons, Electron beams, Particle accelerators, Shielding, Data processing systems.

A model of the radiation effects laboratory has been built to help visualize operational problems and equipment placement. A photograph of the model provides a perspective of the external features of the building. A tower houses one of the major accelerators, a Dynamitron. The second major radiation source is an electron linear accelerator (Linac). This machine is placed in the opposite end of the building from the Dynamitron. A view is given of the model with the roof and overhead shielding removed, showing certain major features of the laboratory. Because of possible settling of the building foundation over a period of years the accelerator and test areas are separated by a specially designed corridor from the control room and support laboratory areas. The laboratory building has an area of approximately 17,000 sq. ft. and will cost approximately $800,000. The accelerator selection and the building design were made on the basis of existing requirements for nuclear weapon and space radiation effects testing. However, the machine and building specifications were written so that many other applications could be served. This document discusses the major features of the laboratory and presents examples of some of the work to be accomplished. (Author)

AD-414 039 Div. 20, 25
(TISTP/MFA) OTS price $2.60

University Coll., London (Gt. Brit.).
REMOVAL OF THE DIVERGENCE IN ZERO MOMENTUM TRANSFER DISPERSION RELATIONS,
by D. Atkinson. 30 Apr 63, 21p. TN12
Grant AF EOAR63 3
AFOSR 4922 Unclassified report

Descriptors: (*Elastic scattering, Analysis), (*Nuclear spins, Equations), (*Particles, Motion), Transformations (Mathematics), Polynomials, Momentum, Functions, Nucleous, Pious, Taylor's series.

A conformal mapping of the scattering cosine of an elastic scattering process is used to remove a divergence caused by crossed channel singularities. A numerical application to pi n - pi n forward dispersion relations is considered. (Author)

21. NUCLEAR PROPULSION

AD-412 780 Div. 21, 14, 27
(TISTA/GEC) OTS price $21.00

General Dynamics, Fort Worth, Tex.
(No title).
Final progress rept., 1 Oct 61-30 Sep 62.
30 Sep 62, 375p. Document no. NARF 62 18P;
FZK 9 184
Contract AF33 657 7201
Unclassified report

Descriptors: (*Thermal reactors, Nuclear propulsion), (*Space propulsion, Nuclear propulsion), Space environmental conditions, Solar flares, Shielding, Protons, Magnetic fields, Neutrons, Radiation effects, Electromagnetic fields, Superconductors, Attenuation, Gamma rays, Heat transfer, Neutron flux, Design, Fast neutrons, Reflection, Auxiliary power plants, Health physics instrumentation, Radiation monitors, Sealing compounds, Laminated plastics, Materials, Films, Lubricants, Polyethylene plastics, Silicon compounds, Elastomers, Acrylonitrile polymers, Research program administration.

22. ORDNANCE

AD-412 685 Div. 22
(TISTM/AMS) OTS price $3.60

Naval Weapons Lab., Dahlgren, Va.
MEASUREMENT OF THE IMPETUS, COVOLUME, AND BURNING RATE OF SOLID PROPELLANTS.
by J. M. Massey, Jr. 31 July 63, 1v.
NWL 1872 Unclassified report

Descriptors: (*Propellants, Burning rate), (*Burning rate, Propellants), Solids, Test methods, Tests, Ballistics, Interior ballistics, Theory, Equations of state, Test equipment, Pressure, Data, Gases, Mathematical analysis, Temperature, Cartridges, Explosive actuators, Shaped charges, Propellant grains.

A method, using closed vessel techniques, for determining the impetus (force constant), covolume, and burning rate of solid propellant is described. Data obtained by this method are presented for thirteen solid propellants. (Author)

AD-412 824 Div. 22
(TISTM/AMS) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
DETONATION INITIATED BY HIGH PRESSURE GAS LOADING OF A SOLID EXPLOSIVE,
by Donna Price and Francis J. Petrone. Aug 63, 18p.
NOL TR63 103 Unclassified report

Descriptors: (*Detonations, Propellants), (*Propellants, Detonations), Shock waves, Solids, Gases, Pressure, Loading (Mechanics), Shock (Mechanics), Deflagration, Sensitivity, Tests, Viscosity, Mathematical analysis, Pentolite, Explosive gases, Explosive actuators, Time, Data.

The Enig-Metcalf one dimensional code has been shown to reproduce experimental trends observed in the shock initiation of solid explosives; it has consequently been used to show that a rapid gas loading of a solid explosive to the initiating pressure for its charge geometry will effect detonation. Both the deflagration to detonation experiments (pressure generated by confined burning of cast explosives) and air-gap sensitivity tests (pressure generated by gaseous detonation products of an explosive donor) are examples of detonation caused by gas loading. In the standardized gap test for propellants, the donor gas products, after travelling 5.5 inches through a steel pipe, produce a pressure of between 21 and 37 kbar in a receptor placed at the end of the pipe. This is in good agreement with the 1-D computed value of about 50 kbar. (Author)

AD-412 985 Div. 22, 9
(TISTP/WH) OTS price $1.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
PRESSURE-THRUST RELATIONSHIPS OF VISCO-ELASTIC FLUIDS.
BiMonthly progress rept. no. 2, 1 June-31 July 63,
by Earl C. Klaubert and Jack Kahrs. 2 Aug 63, 6p.
Contract DA18 108AMC130, RMD Proj. 5513
Unclassified report

Descriptors: (*Flamethrowers, Recoil mechanisms), (*Viscoelasticity, Fluids), Pressure, Thrust, Liquid jets, Nitrogen compounds, Tetroxides, Hydrazine derivatives, Solid rocket propellants.

The physical parameters of gas pressurization (and expulsion) of a visco-elastic fluid (thickened gasoline), and the related problems of means of pressurization and of recoil compensation are studied. Pressurization by means of hot combustion gases was selected for investigation. From the earlier work, a liquid bipropellant gas generator utilizing nitrogen tetroxide (N_2O_4) and unsymmetrical dimethylhydrazine (UDMH) as oxidized and fuel, respectively, was chosen as being representative of a calss of controllable-output hot gas pressure sources. An alternative approach to a source of pressurization and counterrecoil thrust was a solid-propellant rocket with a coolant-diluent bed between the rocket and the flamethrower fuel tank. (Author)

AD-413 159 Div. 22
(TISTP/FEM) OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
REAL TIME METEOROLOGICAL SYSTEM FOR UNGUIDED ROCKET IMPACT PREDICTION,
by Louis D. Duncan. July 63, 43p.
DA Task 1A0 11001B021
AERDA Rept. no. 55 Unclassified report

Descriptors: (*Rocket trajectories, Wind), (*Impact computers, Numerical analysis), (*Real time, Impact computers), (*Circular error probable, Mathematical prediction), Atmospheric motion, Measurement, Data processing systems, Ranges (Establishments), Safety, Projectiles, Recovery, Meteorological parameters, Ballistics.

An automatic real time system is described which will be used for prelaunch impact prediction of unguided rockets at White Sands Missile Range, New Mexico. The ballistic equations utilized by the system are derived and explained. These consist of five equations of motion which describe the position and attitude of the rocket. The wind measuring and data transmission systems are described and the wind data reduction techniques are developed. (Author)

AD-413 516 Div. 22, 19
(TISTP/JP) OTS price $19.75

Mitre Corp., Bedford, Mass.
THEORETICAL STUDIES ON GROUND SHOCK PHENOMENA,
by Melvin L. Baron, Hans H. Bleich, and Paul Weidling. Oct 60, 293p. Rept. no. SR19
Contract AF33 600 39852
ESD TDR63 425
Unclassified report

Descriptors: (*Shock waves, Earth), (*Nuclear explosions, Seismic waves), Theory, Pressure, Wave transmission, Attenuation, Acceleration, Elasticity, Diffraction, Cylindrical bodies.

Contents: Free field effects; Diffraction effects; Steady state response of an elastic half-space due to a surface pressure moving with superseismic speed; Surface waves in an elastic half space; Diffraction of a shear wave by a cylindrical cavity in an elastic medium; Dis-

placements and velocities produced by the diffraction of a pressure wave by a cylindrical cavity in an elastic medium; Determination of shock spectra for installations in cylindrical cavities in elastic media; Elastic properties of granites under static loading. (Author)

AD-413 651 Div. 22, 25
(TISTP/MFA) OTS price $6.60

SKF Industries, Inc., Philadelphia, Pa.
ANALYTICAL STUDY OF THE VIBRATION OF A BEARING WITH FLEXURALLY RIGID RACES.
Special rept.,
by Olof Gustofsson. 3 Oct 61, 1v. Rept. no. AL61L032
Contract NObs78552
Unclassified report

Study of the Vibration Characteristics of Bearings.

Descriptors: (*Ball bearings, Vibration), (*Moments, Deformation, Analysis, Geometry, Elasticity, Equations, Motion, Loading (Mechanics), Differential equations, Velocity.

An analytical study of the vibrations induced by geometrical irregularities (waviness in the race grooves and balls and ball diameter variations) in an axially loaded ball bearing is presented. It is assumed that both races are flexurally rigid and deform elastically only at the contacts between balls and races. Ball mass is taken to be negligible, and zero damping is assumed. To simplify the mathematics a linear approximation of the elastic deformation at the contacts is first used. Effects of certain types of non-linearity are then examined. (Author)

AD-413 679 Div. 22, 25
(TISTP/TL) OTS price $10.00

SKF Industries, Inc., Philadelphia, Pa.
ANALYTICAL STUDY OF THE RADIAL, AXIAL AND ANGULAR VIBRATION OF A BEARING WITH FLEXURALLY RIGID RACES.
Special rept.,
by Olof Gustafsson. 3 Apr 62, 1v. Rept. no. AL62L005
Contract NObs78552
Unclassified report

Study of the Vibration Characteristics of Bearings.

Descriptors: (*Ball bearings, Vibration), Loading, Moments, Trigonometry, Deformation, Elasticity, Velocity, Differential euqation, Statistical analysis, Tests.

An analytical study of the vibration of a bearing with flexurally ridig races is described. The radial vibration of the outer ring of an axially loaded ball bearing rotating at a constant speed is studied. The axial and angular motion of the outer ring were not considered. (Author)

AD-413 689 Div. 22, 25
(TISTP/MFA) OTS price $2.60

SKF Industries, Inc., Philadelphia, Pa.
A STUDY OF ELASTIC VIBRATIONS OF THE OUTER RACE OF A ROLLING ELEMENT BEARING.
Special rept.,
by Ronald L. Huston. 29 Aug 61, 33p. Rept. no. AL61L027
Contract NObs78552
Unclassified report

Study of the Vibration Characteristics of Bearings.

Descriptors: (*Ball bearings, Vibration), Analysis, Elasticity, Deformation, Equations, Motion, Frequency, Differential equations, Binomials, Integration, Theory, Loading (Mechanics), Numerical analysis.

Elastic flexural vibrations of a thin ring (the outer race of a ball bearing) are investigated analytically using mathematical principles common in the theory of mechanical vibrations. The analysis is performed by first deriving a governing differential equation. Exact and approximate solutions of this equation are then presented for various geometrical configurations such as a free circular ring, a circular ring on a linear radial elastic foundation, a circular ring rigidly supported at a number of equally spaced points, and a circular ring supported by a number of equally spaced identical linear springs (simulating the conditions in a bearing). A brief discussion of forced vibrations is also included. Finally, a numerical example is outlined for the SKF 6312 deep groove ball bearing. (Author)

AD-413 690 Div. 22, 25
(TISTP/MFA) OTS price $1.60

SKF Industries, Inc., Philadelphia, Pa.
FLEXURAL VIBRATIONS OF A BALL BEARING OUTER RING DUE TO BALL LOADS.
Special rept.,
by John I. McCool. 6 Dec 61, 18p. Rept. no. AL61L037
Contract NObs78552
Unclassified report

Study of the Vibration Characteristics of Bearings.

Descriptors: (*Ball bearings, Vibration), Geometry, Harmonic analysis, Velocity, Numerical analysis, Loading (Mechanical), Fourier analysis, Deformation, Deflection, Analysis, Shear stresses, Elasticity.

The radial deflection of a thin ring due to bending by equally spaced, equal radial loads is found as a function of the angular coordinate of the ring. By expressing the angular coordinate as a function of time, the wave form of the displacement of a point on the stationary outer ring of a rotating bearing is found. An expression for the RMS level of any harmonic of the vibrational velocity is found by termwise differentiation of the Fourier expansion of the displacement function. As a numerical example the RMS amplitudes are computed for an SKF 6310 single row deep groove ball bearing. (Author)

AD-413 693 Div. 22, 25
(TISTP/MFA) OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress repts. no. 9 and 10, 31 Aug-30 Nov 61,
by James L. Huang. Aug 63, 1v. Rept. no. AL61L038
Contract NObs78552
Unclassified report

Descriptors: (*Ball bearings, Vibration), Accelerometers, Frequency, Damping, Tests, Test equipment, Temperature, Measurement, Numerical analysis, Harmonic analysis, Taylor's series.

The effect of waviness, measured in a broad band, on the bearing vibration is discussed on the basis of SKF experimental data. The effect of the number of balls on the radial bearing vibration, as measured in octave bands, is shown experimentally and a comparison with theory made. Tests with vibration attenuating bearing mounts are reported. Radial vibration spectra of bearings have been studied for comparison with theory presented in Special Report AL61L032. A method for evaluating the damping from the vibration spectrum of a bearing is presented. Trial runs on the vibration tester for large bearings are reported. (Author)

AD-413 698 Div. 22, 25
(TISTP/MFA) OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 14, 1 June-31 July 62,
by James L. Huang. 1963, 1v. Rept. no. AL62L032
Contract NObs78552
Unclassified report

Descriptors: (*Ball bearings, Vibration), Geometry, Detection, Loading (Mechanical), Resonance, Accelerometers, Acceleration, Band spectrum, Measurement, Frequency, Theory.

Resonant frequencies were determined from the narrow band spectra of a 23256 spherical roller bearing run at five different speeds. The narrow band spectrum of a 23256 spherical spherical roller bearing was studied. Theoretically predicted vibration peaks, due to various orders of waviness, were verified. The effect of radial looseness of a 23256 spherical roller bearing on the narrow band spectrum and octave or wide band readings was studied. The effect of axial load on the octave band vibration level of 23256 spherical roller bearings was investigated in the range above 50 cps. (Author)

AD-413 822 Div. 22
(TISTW/PCR) OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
A STUDY OF NOSE DAMAGE TO FUZE. MTSQ. M564 (T197E2) BY IMPACT WITH AIR,
by Jack Brothers. July 63, 13p.
DA Proj. IC523801A295
PA Technical memo. no. 1220
Unclassified report

Descriptors: (*Superquick fuzes, Projectile fuzes), Time delay fuzes, Impact shock, Air, Detonators, Point-detonating fuzes, Firing tests (Ordnance), Nose fuzes, Fuzes (Ordnance).

Laboratory tests were conducted with empty point detonating assemblies of the XM548 (M564 (T197E2)) MTSQ Fuze to determine the extent of damage to the nose (aluminum closing disc) when subjected to ''stationary'' air impact, immediately outside the muzzle, as the projectile is fired from the M113 175mm Gun. The aluminum closing disc 0.0115-0.0030'' thick) may be indented 0.022''. However, damage to the point detonating assembly is insufficient to cause the firing pin to initiate the M50 Detonator. (Author)

23. PERSONNEL AND TRAINING

AD-411 976 Div. 23
(TISTB/MS) OTS price $1.60

System Development Corp., Santa Monica, Calif.
THE CURVE APPROACH TO THE COMPENSATION OF SCIENTISTS,
by Edward A. Shaw. 11 June 63, 11p. SP1229
Unclassified report

Descriptors: (*Scientific personnel, Wages), Statistical analysis, Statistical processes, Economics.

Reports that the curve approach relates salary to the variables of educational attainment, maturity or experience, and relative job performance, making no actual direct reference to actual position responsibilities. Notes various deviations from this approach and discusses these variations. States that basically two general uses can be made of salary curves: 1- as a mechanism to guide salary determinations for the individual scientist, and 2- as a reference for assessing the firm's salary position in the labor market. Discusses problems of the curve approach. Concludes that the curve system is dependent on effective personnel utilization, and on a meaningful quality-rating system. Further concludes that given these, the inherent benefits of the curve approach can be taken advantage of, and its limitations minimized, but that if these elements are lacking, the curve technique will leave much to be desired. (Author)

AD-412 530 Div. 23
(TISTM/MS) OTS price $3.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
EVALUATION OF TESTS TO PREDICT SUCCESS IN AUTOMOTIVE MAINTENANCE HELPER COURSE,
by William H. Helme, Barnett Denton, and Alan A. Anderson. Oct 62, 28p.
Army Proj.)J95 60 001
APRO Technical research note 127
Unclassified report

Descriptors: (*Military personnel, Classification), (*Maintenance personnel, Performance (Human)), (*Aptitude tests, Effectiveness), Selection.

Experimental tests--Mechanical Knowledge (tools), Craftsman Aptitude-Mechanics, Craftsman Aptitude-Construction, and seven self-report personality measures--were administered to samples of trainees in the Automotive Maintenance Helper (MOS 630) course at three training centers. The experimental tests were evaluated and compared with operational ACB tests for effectiveness in predicting written test score, performance test score, and cadre estimates of future performance in an Army assignment. The ACB Automotive Information Test was the most heavily weighted test in composites predictive of aspects of success in the course. In predicting the estimated job success criterion, however, the experimental Mechanical Knowledge Test and the Craftsman Aptitude tests were somewhat more effective than the ACB Mechanical Aptitude Test, suggesting the promise of such tests in differential classification for mechanical jobs. (Author)

Division 23 - PERSONNEL AND TRAINING

AD-412 641 Div. 23, 5
(TISTB/MS) OTS price $2.50

Bell Aerosystems Co., Buffalo, N. Y.
DEVELOPMENT OF VISUAL SIMULATION TECHNIQUES FOR ASTRONAUTICAL FLIGHT TRAINING. VOLUME I: HIGH RESOLUTION TELEVISION; ELECTRONIC PLANETARIUM.
Final rept., Jan 61-May 62,
by T. F. Buddenhagen, A. B. Johnson, S. C. Stephan, and M. P. Wolpin. June 63, 110p.
Contract AF33 616 7802, Proj. 6114, Task 611405
AMRL TDR63 54, vol. 1 Unclassified report

Report on Training Equipment, Simulators, and Techniques for Air Force Systems.

Descriptors: (*Space flight, Training devices), (*Space environmental conditions, Simulation), Television display systems, Astronautics.

A program was conducted to study extra wideband closed circuit television, to experimentally evaluate available high resolution closed circuit television and high gain projection screens, and to develop a technique for the electronic generation of the celestial star field. These subjects were selected from the problem areas recommended for further study and development in the preliminary phase of this study, reported in Wright Air Development Division Technical Report 60-756, 'A Study of Visual Simulation Techniques for Astronautical Flight Training.' The state-of-the-art of wideband television was studied and performance growth for the next ten years is predicted. The experimental evaluation of a 20-mc television system led to a greater understanding of the capabilities and limitations of wideband television systems. The investigation of high gain projection screens examined the areas of simulation in which the various types of screen material are most useful and those in which further development is needed to realize the full potentials of material designs. The development of the electronic generation of the celestial star field demonstrates the feasibility of the electronic storage of digital data for the description of visual scenes. (Author)

AD-412 850 Div. 23
(TISTM/MS) OTS price $1.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
PREDICTION OF SUCCESS IN AUTOMATIC DATA PROCESSING PROGRAMMING COURSE,
by Aaron Katz and William W. Helme. Oct 62, 9p.
Army Proj. 0J95 60 001
APRO Technical research note no. 126
Unclassified report

Descriptors: (*Military personnel, Selection), (*Aptitude tests, Effectiveness), Programming (Computers), Classification.

The present study was undertaken, at request of the Signal School, Fort Monmouth, to improve selection of enlisted students in the Automatic Data Processing (Fieldata) Programming course. Three Army Classification Battery composites--thecurrent (1962) Clerical Aptitude Area, the previous operational composite, and the General Technical Aptitude Area, a logical alternate--were evaluated for effectiveness as selectors for the course. The IBM Programmers Aptitude Test, an instrument used at the Signal School for selecting programmer trainees, was also included in the analysis. Calidity was assessed against final course grades. While the Programmers test had the most substantial validity (r equals .67) of any single measure in the study, the General Technical (GT) Aptitude Area proved the most effective test combination (r equals .61) for selection to the ADPS Programming course. Results supported a change in the aptitude area of selection to the ADPS course from CL to GT with a cutting score of 110.

AD-413 151 Div. 23, 28
(TISTB/MS) OTS price $3.60

Naval School of Aviation Medicine, Pensacola, Fla.
REASONS FOR VOLUNTARY WITHDRAWAL FROM NAVAL AVIATION TRAINING,
by Rosalie K. Ambler and Everette R. Burnette.
15 Mar 63, 32p.
NSAM Special rept. no. 63-2
Unclassified report

Descriptors: (*Naval aviation, Training), (*Naval personnel, Training), (*Training, Flight), Military training, Performance (Human).

With minor exceptions the findings were similar to earlier studies of this type. It was demonstrated that most students dropped because of negative attitudes toward flying, which ranged from dislike to disabling tension. The commissioned students reported significantly fewer nonflying causes than did cadets. With respect to pressure from wives, dissatisfaction with instructors, or dissatisfaction with pipeline assignment, these were mentioned by a negligible number of students. Significantly more DOR's, however, had had a year or more of active duty before reporting to Pensacola than did the trainee population as a whole. ''Poor performance'' and ''change in career interests'' were the main reasons for dropping given by the nonpilot naval aviation officer trainees. (Author)

AD-413 472 Div. 23, 28, 16
(TISTM/AMS) OTS price $2.60

Training Research Lab., U. of Illinois, Urbana.
TWO-CHOICE CONDITIONAL PROBABILITY LEARNING WITH MEANINGFUL AND NON-MEANINGFUL STIMULI,
by Glenn I. Hatton, Fred E. Fiedler, Lawrence M. Stolurow and Harry C. Triandis. Oct 62, 17p.
Technical rept. no. 9
Contract Nonr 1834 36
Unclassified report

Descriptors: (*Learning, Psychology), (*Psychology, Learning), Stimulation, Test construction (Physchology), Correlation techniques, Probability, Training, Behavior, Group dynamics, Performance tests.

An experiment using a two-choice conditional probability learning task was reported. The first-order conditional probability for the two-choice tasks was held constant at .70/.30. The design of the experiment was a 2 x 4 x 4 Lindquist Type III design (Lindquist, 1953). A set of 200 trials on each of 2 tasks was given each S. One task was to discover the conditional relationships with meaningful stimuli (nouns and adjectives). The second task was to discover the same relationships with non-meaningful stimuli (Xs and Os). Four information conditions were used and four separate replications run. Significant differences among information groups within the two tasks were found. Also Ss obtained significantly higher scores on the non-meaningful

than on the meaningful task although they markedly improved in each task over the 200 trials. One puzzling finding was that the information group given only probability information and no cue-stimulus information performed significantly poorer on the meaningful set than did the no-information control. This was interpreted as demonstrating the detrimental effect of testing too many hypotheses in such a task. Finally, asymptotic data were discussed in terms of matching phenomena. (Author)

AD-413 524 Div. 23
(TISTB/MS) OTS price $4.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
THE CHECKOUT AND MAINTENANCE (CAM) TRAINER: 1. INSTRUCTIONS AND PROGRAMS FOR USE,
by Eugene R. Hall, John A. Modrick, and Paul R. Richard. June 63, 41p.
AMRL Memorandum P39
Unclassified report

Descriptors: (*Maintenance, Training devices), (*Training device, Instruction manuals), (*Maintenance equipment, Electronics), Checkout procedures.

This report is intended primarily as an aid to those using, or planning to use, the Checkout and Maintenance (CAM) trainer. The report provides a brief description of the CAM trainer, detailed instructions for its operation, and the instructional programs prepared for use with the trainer. These programs teach checkout procedures and other information relevant to the operation of the radar system used with the trainer. The CAM trainer was developed for use in research to improve electronic maintenance. It includes an AN/ASB-4 radar bombing navigational system, special electronic equipment to make the system function on the ground, a specially constructed device for presenting instructions to a student, and equipment to measure the student's performance. Under controlled conditions, the CAM trainer presents taks similar to those encountered in the maintenance of modern complex electronic systems. These tasks can be used for research on problems such as determining the major sources of difficulty in electronic maintenance, determining the best techniques and devices for training and aiding electronic maintenance personnel, and developing techniques for evaluating the proficiency of personnel performing electronic maintenance. (Author)

AD-413 536 Div. 23
(TISTM/AMS) OTS price $3.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
GROUPING ARMY TRAINING COURSES BY ARMY CLASSIFICATION BATTERY FACTORS,
by William H. Helme and David J. Fitch.
Oct 62, 26p.
Proj. 0J95 60 001
APRO TRN128 Unclassified report

Descriptors: (*Personnel management, Classification), (*Army, Personnel management), (*Test methods, Personnel management), Military personnel, Human engineering, Selection, Achievement tests, Aptitude tests, Intelligence tests, Test construction (Psychology), Tests, Training, Data.

Present report interprets results of a factor analysis of Army Classification Battery (ACB) tests, extended to 75 MOS criteria (final grades in enlisted training courses) in terms of test-job interrelationships and occupational groupings. Of the ten job groups into which the 75 MOS were allocated, nine were well differentiated by ACB test combinations closely resembling current aptitude area selectors. Validity patternsn suggested feasibility of clustering MOS courses for classification purposes on the basis of technical level as well as on content. Academic skills were found to play a part in success in all courses. Results of the analysis were interpreted as additional guidelines for developing new ACB measures and for eventual reconstitution of the Aptutude Area system. (Author)

AD-413 587 Div. 23, 30
(TISTB/AAR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVELOPMENT OF SCIENCE IN SIBERIA AND IN THE FAR EAST,
by M. A. Lavrent'yev. 3 June 63, 9p.
FTD TT63 234 Unclassified report

Trans. from Vestnik, AN SSSR, Vol. 12, pp. 3-7, 1957.

Descriptors: (*Scientific research, Agriculture), (*Forestry, Scientific research), Economics, Industries, Industrial research.

AD-413 602 Div. 23
(TISTB/AAR) OTS price $16.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE FIRST ASTRONAUTS AND THE FIRST SCOUTS OF OUTER SPACE (Pervyye Kosmonavty i Pervyye Razvedchiki Kosmosa),
by M. A. Gerd and N. N. Gurovskiy. 23 May 63, 258p.
FTD TT 62 1300 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk SSSR, Moskva, pp. 1-198, 1962.

Descriptors: (*Astronauts, Training), Selection, Dogs, Behavior, Clothing, Food, Physiology, Vibration, Noise, Hypoxia, Closed-cycle ecological systems, Space flight.

AD-413 787 Div. 23, 1
(TISTB/AAR) OTS price $2.60

Boeing Co., Seattle, Wash.
SAC PERSONNEL ASSEMBLY AND CHECKOUT INTEGRATION PLAN - WHITEMAN AIR FORCE BASE,
by J. W. Nageley, Jr. 13 May 63, 22p. Document no. D2 12793 4
Contract AF04 647 938
Unclassified report

Descriptors: (*Personnel, Checkout procedures), (*Checkout procedures, Personnel), Weapon systems, Maintenance, Handling, Guided missiles, Strategic weapons, Strategic Air Command, Training.

AD-413 883 Div. 23
(TISTA/MB) OTS price $6.60

Naval Training Device Center, Port Washington, N. Y.
DEVICES UNDER DEVELOPMENT. TRAINING DEVICE GUIDE. SUPPLEMENT NO. 1.
June 63, 1v. Change page notice no. 5
NAVEXOS P530 2S1R5 Unclassified report

This revision provides added Training Device Information Sheets list of revised, deleted, and added pages, and a corrected List of Devices.

Descriptors: (*Training devices, Naval personnel), (*Armed forces supplies, Training devices), Naval procurement.

Revised list of naval training devices, supplement no. 1. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-412 320 Div. 24, 30, 8
(TISTE/JWS) OTS price $1.60

Michigan U., Coll. of Literature Science and the Arts, Ann Arbor.
A PULSED RAPID FILM ADVANCE CAMERA,
by D. E. Damouth and O. E. Haas. July 63, 15p.
Technical rept. no. 13; Rept. no. 03106 13T
Contract Nonr122423, ORA Proj. 03106
Unclassified report

Descriptors: (*Cameras, Proton accelerators), (*Motion picture film, Drives), Electric motors, Cams, Trigger circuits, Solenoids, Drive sprockets, Transistors.

A camera was developed which will, after the occurrence of an event in a proton accelerator, advance one frame of film in a very short time, then wait for the next event which may occur after some radom time interbal. This cycle must then be repeated up to seven times. The camera will advance a double frame (eight sprocket holes, which is approximately 1.5 in.) in less than 30 ms, thus allowing an increase of up to a factor of ten in the rate of data accumulation over conventional equipment which obtains one picture per accelerator pulse. (Author)

AD-412 656 Div. 24
(TISTP/FEM) OTS price $7.60

Electronic Associates, Inc., Princeton, N. J.
AN ANALYSIS OF PANORAMIC PHOTOGRAMMETRY USING AN ANALOG COMPUTER MODEL FOR ERROR DETERMINATION,
by A. E. Rogers and D. Basson. Dec 62, 67p.
Contract NOw62 0851C
Unclassified report

Descriptors: (*Aerial photography, Aerial cameras), (*Mapping, Errors), (*Panoramic cameras, Position finding), (*Photogrammetry, Analog computers), Geometry, Earth, Scanning, Motion, Films, Exposure, Images, Mathematical analysis, Computers, Photographic processors.

The quantitative effects of steady state and dynamic errors in camera orientation and position on distances in a panoramic photograph are analyzed and calculated. Error curves plotted as continuous functions of scan angle are presented for many diverse conditions allowing the determination of photogrammetric error at all points of a panoramic photograph. The effect of IMC error is computed while the quantitative effects of earth curvature and refraction are summarized in a Universal Curve. The problem of determining the orientation of a camera from points appearing in a photograph is examined. Several analog and hybrid (digital-analog) schemes for solution of the orientation problem are suggested. (Author)

AD-412 777 Div. 24, 4, 25
(TISTM/AMS) OTS price $1.60

Palermo U. (Italy).
MICROWAVE AND OPTICAL EXPERIMENTS ON PURE AND DOPED SILVER HALIDES CRYSTALS WITH A VIEW TO ELUCIDATING THE ROLE OF IMPURITIES AND DISLOCATIONS IN THE PHOTOGRAPHIC PROCESS.
Final technical rept. 1 Dec 61-30 Nov 62.
1v.
Contract DA91 591EUC2065
Unclassified report

Descriptors: (*Silver compounds, Halides), Impurities, Crystals, Copper, Copper compounds, Chlorides, Bromides, Cadmium, Radiation damage, Absorption, Optical properties, Density, Electrons, Ions, Single crystals, Microwaves, Photography, Illumination.

AD-413 338 Div. 24
(TISTP/WA) OTS price $3.60

Florence U. (Italy).
RADIATION FROM A CHARGED PARTICLE IN UNIFORM STRAIGHT MOTION THROUGH A PERIODIC SET OF DIELECTRIC PLATES,
by A. M. Scheggi. Mar 63, 32p. Technical note no. 5
Grant AF EOAR62 103
AFCRL Rept. no. 63 168 Unclassified report

Descriptors: (*Charged particles, Motion), Refractive index, Mathematical analysis, Electromagnetic fields, Scattering, Velocity, Functional analysis, Cerenkov radiation, Dielectric films.

The exact solution is given of the problem of transition radiation produced by the passage of a charged particle through an arbitrary number of dielectric slabs separated by vacuum spaces. Expressions for the electromagnetic fields and for the radiated energy have been found which are more general than those given by Garibyan. The expressions given in this report are valid for material slabs of arbitrary refractive index and for velocities of the particle which can be either below or above the Cerenkov threshold for the dielectric considered. (Author)

AD-413 378 Div. 24, 2, 30
(TISTA/VGW) OTS price $9.60

Weiser Associates, Inc., Washington, D. C.
DIGITAL DATA ARCHIVAL SYSTEM FOR NIMBUS SATELLITE.

Final rept.,
by S. Weiser and E. Stein. 31 May 63, 113p.
Contract Cwb10475, Task 2

Unclassified report

Descriptors: (*Meteorological satellites, Photographic reconnaissance), (*Photographic reconnaissance, Data storage systems), Digital systems, Digital recording systems, Telemetering data, Clouds, Photographic films, Photographic recording systems, Photographic printers, Design, Specifications.

In the near future a NIMBUS Satellite will be sent into orbit to collect data on global weather conditions. This satellite represents a significant advance over the earlier TIROS series, since it will travel in a polar orbit and be earth oriented to give continuous data coverage. This will be in the form of photographic images of cloud cover with supplemental infrared information to provide a comprehensive record of upper atmospheric conditions. This report is primarily concerned with the information collected by the camera sensors and transmitted back to earth by telemetering links. It is especially concerned with the study and development of an archival system for storing this information in the digital form resulting from the extensive computer processing program. This study includes an analysis of problems encountered in storing digital information for long periods of time, the access requirements of the potential scientific user and the ''state of the art'' of storage and retrieval systems at this time. (Author)

AD-413 532 Div. 24
(TISTP/WA) OTS PRICE $5.60

Technical operations Inc., Burlington, Mass.
THE EFFECT OF RADIATION REFLECTED FROM THE CEILING ON THE DOSE RATE WITHIN STRUCTURES,
by John F. Batter and Joseph D. Velletri.
Apr 63, 50p. TO B63 25
Contract OCD OS62 14, Subtask 1111A (formerly proj. 1101)

Unclassified report

Descriptors: (*Electromagnetic wave, Detectors), Materials, Ceiling, Dose rate, Collimators, Concrete, Iron, Numerical methods and procedures, Photons, Albedo.

An experiment was designed to estimate the effect of ceiling-scattered radiation on the dose rate within a structure. Measurements of the contributions as a function of the solid angle subtended by the ceiling as viewed from a detector are compared to results calculated using albedo data. The total magnitude of ceiling-shine radiation is found to be similar to that of skyshine radiation. (Author)

25. PHYSICS

AD-411 760 Div. 25, 9
(TISTM/TCG) OTS price $1.75

Polytechnic Inst. of Brooklyn, N. Y.
MIXING PROBLEMS WITH CHEMICAL REACTIONS,
by Victor Zakkay and Egon Krause. June 63, 55p.
Contract AF33 616 7661, Proj. 7064, Task 7064 01
ARL 63 109 Unclassified report

Descriptors: (*Air, Mixtures), (*Hydrogen, Mixtures), (*Mixtures, Chemical reactions), Combustion, Gases, Diffusion, Supersonic flow, Aerodynamic characteristic.

An investigation of turbulent mixing with chemical reaction for Air-Hydrogen mixtures is presented. First an analysis is given whereby the reaction products for finite reaction rates may be determined along streamlines, provided the quantities in the flow field of mixing under frozen conditions are know. Then measurements of concentrations, pressures, velocities, and stagnation temperatures along the centerline of two coaxial jets with and without chemical reaction are presented. These measurements are used in order to determine the flow parameters ahead of the flame, and also in calculating flame shapes under equilibrium conditions. Finally, detailed flame shapes are included for various boundary conditions and compared with the theoretical predictions. (Author)

AD-411 762 Div. 25
(TISTP/MFA) OTS price $8.10

Westinghouse Electric Corp., Pittsburgh, Pa.
LONG LIFE CLOSED LOOP MHD RESEARCH AND DEVELOPMENT UNIT.
Interim scientific rept. no. 5, 15 Mar-15 June 63
15 June 63, 1v.
Contract AF33 657 8311
Unclassified report

Descriptors: (*Magnetohydrodynamics, Space propulsion), X-ray diffraction analysis, Metallography, Ionization, Refractory materials, Generators, Electrical properties, Tests, Fluid flow, Design, Hardness, Measurement, Photometers, Power supplies, Tantalum, Capacitors, Vaporization, Ablation, Ducts, Recombination reactions, Dissociation.

The major ultimate advantage of an MHD power generation system for use in space stems from its ability to operate at extremely high temperatures, thereby affording appreciable savings in weight. In a space power plant, the power output per unit weight of the system is of prime importance and this may well be the decisive factor in favor of MHD. Higher top temperatures permit higher rejection temperatures and as a result lower weight of the radiator which is often one of the heaviest components in a space power system. (Author)

AD-411 763 Div. 25, 33
(TISTP/RLG) OTS price $4.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 8, 1 June-31 July 61.
31 July 61, 8p. AL61L031
Contract NObs78552, Proj. NR071 200; V3
Unclassified report

Descriptors: (*Bearings, Vibration), Roller bearings, Experimental data, Loading (Mechanics), Measurement, Velocity, Theory, Test equipment, Band spectrum, Resonance, Tests, Microstructure.

The effect of the number of rolling elements on the radial vibration spectrum expressed in octave bands is shown experimentally. Vibrations of 6305 bearings in axial direction were studied at various loads and speeds. Radial vibration spectra of 6322, 6312, 6305 and 6203 bearings were recorded for determination of outer ring resonances; comparison to theory is made. Narrow band spectra were taken showing the fine structure of a 6305 and 6312 bearing vibration spectrum. The status of procurement of bearings with improved smooth running characteristics (both large roller bearings and small ''Amendment 3'' bearings) is reported. Waviness measurements on large roller bearing races are reported and a newly installed vertical wavometer is described. Some experiences gained during trial runs of the newly installed large bearings vibration tester are reported. (Author)

AD-411 782 Div. 25
(TISTP/MFA) OTS price $.75

Electronics Research Lab., U. of Calif., Berkeley.
INTENSITY MEASUREMENTS FOR OPTICAL MASER APPLICATIONS,
by William F. Kolbe. 22 Apr 63, 17p. 63 6
Grant DA ARO D31 124G151
AROD 3323 2 Unclassified report

Descriptors: (*Lasers, Theory), (*Intensity, Measurement), Photoelectric effect, Calibration, Light, Brightness, Photomultipliers, Sensitivity, Line spectrum, Spectrum analyzers, Emissivity, Continuous spectrum, Flash lamps, Photometers, Attenuation, Tungsten, Optics, Blackbody radiation.

The experimental determination of absolute intensities of visible and near-visible light sources is considered. A photoelectric method was used, incorporating a Jarrell-Ash 3.4-meter Ebert Spectrograph and a tungsten strip filament lamp as a standard source. Calibration curves covering the spectrum from 3500 to 11,000 Angstroms were obtained relating the source brightness B(lambda) to the photomultiplier current I(lambda) for the spectrograph used. The preliminary measurements made indicate that the method is reasonably accurate in determining the relative intensities of various spectral lines of a given source, but only moderately successful in determining absolute intensities. Some methods for improving the latter are considered. (Author)

AD-411 784 Div. 25, 2
(TISTP/RLG) OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
SOME DYNAMIC CHARACTERISTICS OF ROCKS,
by Werner Goldsmith and Carl F. Austin. May 63, 34p.
NAVWEPS Rept. 8117; NOTS TP3205
Unclassified report

Descriptors: (*Rock (Geology), Dynamics), (*Shock waves, Wave transmission), (*Loading, Impact shock), Explosion effects, Tests, Preparation, Velocity, Propagation, Scattering, Transformations, Seismic waves, Microscopy, Bibliographies, Strain gages, Aluminum alloys, Experimental data, Mathematical models, Statics, Rods.

A study was made of the transmission and decay of pulses produced both by impact and explosive loading in a rock classified as a diorite. The samples were chosen and prepared with sufficient care and tested under identical conditions so that reproducibility of results comparable to that expected in metallic systems was obtained. Ballistically suspended Hopkinson bars of diorite of 3/4-inch diameter and approximately 22 inches long were subjected to longitudinal impact by spherical and flat-ended cylindrical projectiles of hardened steel at an initial velocity of about 3,300 in/sec. Strain gages attached to the specimens at various stations permitted a recording of the shape and velocity of propagation of the resultant wave. Similar experiments were performed on an aluminum alloy bar of identical size to assess the magnitude of the dispersion resulting from the three-dimensional character of the rod. The nature of the transformation of the pulse during passage permits as assessment of the validity of various models proposed for geologic substances in the field of seismology. A further detailed study of the internal response of the samples to such pulse passage was accomplished by means of microscopy and static tests, which correlated very well with the dynamic results. (Author)

AD-411 799 Div. 25
(TISTA/LSK) OTS price $6.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ROCKET HEAT TRANSFER MEASURING DEVICES AND TECHNIQUES,
by S. Wehofer. July 63, 53p.
Contract AF40 600 1000, Proj. 6950, Task 695006
AEDC TDR63 93 Unclassified report

Descriptors: (*Base flow, Heat transfer), (*Heat transfer, Measurement), Instrumentation, Calorimeters, Thermol radiation, Exhaust gases, Rocket motors.

An investigation was conducted to find suitable devices and techniques for measuring heat transfer rates in the base areas of rocket-powered missiles. A slug mass calorimeter was selected to measure total (convective and radiant) heat rates, and a black-body cavity was selected to measure radiant heat rates. Similar instruments have been used in past test programs; however, the simplifying methods of analysis as used in the past with these instruments may result in considerable errors. The approach taken in this report was to determine the source heat rate by writing a general heat balance equation as a function of time about the heat sensing unit. An experimental program utilizing a box-type muffle furnace to achieve a known source heat rate, was conducted to determine the accuracy of the mathematical analysis used herein. The results of the experimental program illustrated that heat transfer rates may be measured with reasonable accuracy providing basic fundamentals are adhered to and good engineering practices are utilized in the instrument design. In addition, the instruments and techniques as presented in this report should, in general, apply to other testing applications. (Author)

AD-411 800 Div. 25, 8, 14
(TISTE/PAR) OTS price $2.60

Servomechanisms Inc., Goleta, Calif.
ARMY/NAVY INSTRUMENTATION PROGRAM ORGANIC FILM TUNNEL EMISSION INVESTIGATION.
Final rept., 1 Sep 62-17 Feb 63,
by Gordon N. Steele. Mar 63, 27p. SMIR63 1
Unclassified report
Subcontract to Douglas Aircraft Co., Inc., El Segundo, Calif., Contract Nonr107600.

Descriptors: (*Dielectric films, Organic compounds), (*Organic compounds, Dielectric films), (*Semiconductor devices, Organic compounds), Field emission, Transistors, Tunnel diodes, Metal films, Solid state physics, Manufacturing methods, Van de graff generator, Polarization, Electric fields, Electrical properties, Vapor plating, Vacuum apparatus.

In contrast to the work reported here, the conventional approach to the solid state triode based on electron tunnelling has resulted in disappointingly small emission currents. It is hypothesized that two primary factors are responsible for this. These are, (a) the rounding off of the dielectric barrier at the emitter-dielectric interface causes 'hot electrons' to tunnel by internal field emission within the dielectric rather than injection from the metal; and (b) the highly ionic nature of the oxides conventionally employed for the dielectric is responsible for excessive scattering of the 'hot electrons' within the dielectric. A method of circumventing both of these factors appears to be possible by substituting a polarized organic film for the conventional inorganic dielectric. Of a series of organic compounds tested for this purpose an organic dye, fluorescein, was found to be most suitable. Employing this compound, techniques were developed for vacuum depositing pinhole free dielectric films over the thickness range of 30 to 2000 A when the receiving surface was Nesa glass. (Author)

AD-411 807 Div. 25
(TISTP/JP) OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE PLASMA RESONANCE IN INCOHERENT SCATTERING OF RADIO WAVES FROM A FULLY IONIZED PLASMA,
by Victor Gilinsky and Donald DuBois. July 63, 17p. Memo no. RM 3696 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Plasma oscillations, Resonance), (*Radio waves, Incoherent scattering), Ionization, Plasma medium, Scattering.

The detailed shape of the plasma resonance in the spectrum of radio waves incoherently scattered from a hot plasma is presented. The calculation includes exactly the lowest order effects of close collisions in the limit of long wavelength of the radiation and high plasma temperature. However, the results are applicable to some experiments to be performed on incoherent scattering of radar beams from the ionosphere. The magnetic field is neglected but this is a good approximation at high frequencies. The effect of collisions with neutral atoms has also been neglected and this restricts the validity of the results to altitudes above 200 km. A diagrammatic description of electrical interactions of charged particles is used and a weakly coupled, high-temperature plasma in thermodynamic equilibrium is assumed. (Author)

AD-411 810 Div. 25
(TISTP/MFA) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
ANALYSIS OF DYNAMIC EFFECTS OF ADDED MASS AND INITIAL STRESSES TO ELASTIC SYSTEMS.
Final rept. 1 Nov 55-31 Oct 60,

by George H. Handelman and William E. Boyce.
25 Nov 60, 11p. MathRep no. 38
Contract AF18 600 1586
AFOSR 373 Unclassified report

Descriptors: (*Stresses, Analysis), (*Structures, Dynamics), Metal plates, Beams (Structural), Membranes, Vibration, Stability, Deformation, Loading (Mechanics).

AD-411 816 Div. 25
(TISTP/RLG) OTS price $2.60

Batelle Memorial Inst., Columbus, Ohio.
EXPERIMENTAL DETERMINATION OF THE VISCOSITY OF AIR IN THE GASEOUS STATE AT LOW TEMPERATURES AND PRESSURES.
Rept. for 12 June 61-11 Dec 62,
by Daniel R. Grieser and William H. Goldthwaite.
June 63, 20p.
Contract AF40 600 938, Proj. 8951, Task 89603
AEDC TDR63 143
Unclassified report

Descriptors: (*Viscosity, Air), (*Cryogenics, Experimental data), (*Low pressure research, Gases), Low temperature research, Determination, Viscosimeters, Equations, Curve fitting, Drag, Measurement, Calibration, Analysis, Tables.

A program was undertaken to determine the viscosity of gaseous air at cryogenic temperatures for use in the interpretation of hypervelocity wind-tunnel data. Data were obtained over a temperature range of 92.7 to 198.0 R using an oscillating-disk viscosimeter designed for cryogenic operation. Data were also obtained at greatly reduced pressures where the slip effect becomes important. This was done to aid in the evaluation of the lowest temperature data, where reduced pressures were mandatory in order to avoid condensation. A fit of the viscosity data to a temperature-viscosity equation of the Sutherland form was made. The data obtained at the lowest temperatures deviated from the behavior predicted by the Sutherland Formula. A minor deviation occurred in the vicinity of 140 R, while the major deviation occurred at the lowest temperature of 92.7 R. At this latter temperature, the measured air drag was essentially zero. No substantiated explanation has been given for this latter behavior. (Author)

AD-411 843 Div. 25, 8
(TISTP/WH) OTS price $2.60

Brown U., Providence, R. I.
A METHOD OF ANALYZING TIME DEPENDENT CYLINDRICAL DISCHARGES,
by Paul R. Caron and Ralph D. Kodis. Dec 62,
24p. Scientific rept. no. 19
Contract AF19 604 4561, Proj. 5635, Task 563502
AFCRL Rept. no. 63 9 Unclassified report

Descriptors: (*Plasma physics, Gas discharges), (*Gas discharges, Plasma physics), Electrons, Ions, Velocity, Electric discharges, Secondary emission, Integration, Partial differential equations, Integral transforms.

Expressions are developed for electron, ion and total current in a cylindrical discharge excited by an externally generated delta function of electrons. The problem solved is an idealized model of a cylindrical discharge excited by an alpha-particle or by a spark light source. Approximations based on the nature of the first Townsend coefficient and the ion velocity are used. The expression for total current shows excellent agreement with published experimental curves. (Author)

AD-411 848 Div. 25
(TISTP/HG) OTS price $5.60

Cruft Lab., Harvard U., Cambridge, Mass.
EXTENSIONS OF LINEAR, LEAST-SQUARES SAMPLING THEORY,
by Donald W. Tufts and Nicolas Johnson.
10 Apr 63, 1v. TR407
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Sampling, Theory), (*Least squares methods, Numerical analysis), (*Mathematical prediction, Signals), Functions, Stochastic processes, Sequences, Operators (Mathematics), Numerical methods and procedures, Integrals, Integral transforms, Equations, Matrix algebra, Polynomials, Signal-to-noise ratio, Algebra.

This paper presents some new results in the interpolation theory of random processes. These results are applied to the problem of reconstructing a random waveform from instantaneous samples. The main concern is with the removing of some of the restrictions of the interpolation method that is based on the ordinary sampling theory. In particular it is not assumed that an infinite number of samples is available, nor that the sampled random process is band-limited. On the other hand, the authors wish to preserve the practical (but not theoretical) simplicity of the type of interpolation that corresponds to time-invariant filtering. (Author)

AD-411 849 Div. 25
(TISTP/MFA) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
RADIATION FROM A UNIFORMLY MOVING DISTRIBUTION OF ELECTRIC CHARGE IN AN ANISOTROPIC, COMPRESSIBLE PLASMA.
by H. S. Tuan and S. R. Seshadri. 2 May 63, 21p.
Technical rept. no. 410
Contract Nonr186632, Proj. NR371 016
Unclassified report

Descriptors: (*Plasma medium, Wave transmission), (*Cerenkov radiation, Excitation), Fourier analysis, Integral transforms, Equations of state, Gases, Electrons, Frequency, Partial differential equations, Functions, Propagation, Magnetic fields, Electromagnetic waves, Velocity.

The radiation characteristics of a linear distribution of electric charge moving with a uniform velocity in a homogeneous electron plasma of infinite extend are investigated for the case in which a uniform static magnetic field is impressed externally throughout the medium. The linear distribution of charge and its direction of motion are assumed to be parallel and perpendicular, respectively, to the direction of the external magnetic field. Of the two possible modes of waves of small amplitude, namely, the modified electromagnetic mode and the modified plasma mode, the uniformly moving charge distribution excites the modified plasma mode. The emitted radiation has no frequencies less than the plasma frequency. For a particular value of the ratio of the gyrotropic to the plasma frequency. For a particular value of the ratio of the gyrotropic to the plasma frequency of the electrons, the frequency and the angular spectrum of the emitted radiation are determined for two values of the velocity of the charge. (Author)

AD-411 870 Div. 25, 30
(TISTP/RLG) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
STANDARDIZED THERMODYNAMIC DATA,
by Charles B. Root and Bernard A. Burke.
14 Dec 62, 30p.
NOLTR 62 211 Unclassified report

Descriptors: (*Thermodynamics, Standards), (*Programming (Computers), Preparation), Data, Tables, Data processing systems, Punched cards, Magnetic tape, Analysis, Propellants.

The preparation of a set of standardized thermodynamic data, using the JANAF printed Thermochemical Tables and JANAF punched IBM cards as a source of standard data is described. Collection, analysis, and conversion of the data to NOL format are discussed. A computer program, which is described, was used to facilitate certain phases of the work. Comparison of data generated from the standardized tape with that in the JANAF tables was made using Al(g,1,s), Al2O3(1,s), B2O2(g) and CO(g) as test species. Agreement was better than 0.1%, with a few exceptions. The tape contents, approximately 400 species of 24 different elements, are listed and recommendations made for future additions and revisions. (Author)

AD-411 873 Div. 25, 26, 17
(TISTM/EJH) OTS price $2.60

ITT Federal Labs., Palo Alto, Calif.
TRACE IMPURITY EFFECTS ON GROWTH HILLOCKS DURING EPITAXIAL ELECTRODEPOSITION FROM COPPER PERCHLORATE SOLUTIONS.
Scientific rept. no. 2, June-Dec 62,
by D. Shanefield and P. E. Lighty. May 63, 24p.
Contract AF19 604 8490, Proj. 4608, Task 460805
AFCRL 63 172 Unclassified report

Descriptors: (*Copper, Electrodeposition), (*Single crystals, Electrodeposition), (*Electrodeposition, Copper), (*Crystal growth, Electrodeposition), (*Epitaxial growth, Copper), Impurities, Surfaces, X-ray photography, Perchlorates, Solutions.

Growth hillocks ordinarily cover the surface of copper electrodeposits from reagent grade solutions. A 75% decrease in the number of hillocks was observed when the plating baths were purified by pre-electrolysis and oxidation. When gelatin or Pb++ were added in ppm or ppb concentration to the purified solutions, the surfaces of new electrodeposits were then completely covered with growth hillocks. It is concluded that the formation of surface features during electrodeposition from reagent grade solutions is affected by the presence of trace impurities. (Author)

AD-411 922 Div. 25
(TISTP/MFA) OTS price $4.60

MITRE Corp., Bedford, Mass.
ELASTIC-PLASTIC ANALYSIS OF CENTRALLY CLAMPED ANNULAR PLATES UNDER UNIFORM LOADS,
by Francis W. French. Dec 62, 41p. Rept. no. SR62
Contract AF33 600 39852, Proj. 607
ESD TDR63 398 Unclassified report

Descriptors: (*Metal plates, Sandwich construction), (*Antennas, Model tests), (*Elastic shells, Analysis), Deformation, Loading (Mechanics), Plasticity, Stresses, Deflection, Structural shells, Plastics.

The elastic-plastic behavior of centrally clamped annular plates under uniform pressure load is investigated within the scope of small deflection bending theory of plates. An elastic-perfectly plastic relation between bending moment and curvature is assumed, together with the Tresca yield condition and associated flow law. Nondimensional equations are developed for the deformations and stress distribution up to collapse. Numerical examples illustrate the development and progress of elastic and plastic regions within the plate, and the change in deflected shape with load. (Author)

AD-411 925 Div. 25
(TISTP/JP) OTS price $2.60

North Carolina State Coll., School of Physical Sciences and Applied Mathematics, Raleigh.
A TWO DIMENSIONAL CRACK PROBLEM.
Memorandum,
by Morton Lowengrub. 1 June 63, 18p.
Contract AF49 638 1159
Unclassified report

Descriptors: (*Fracture (Mechanics), Mathematical analysis), Integral equations, Stresses, Elasticity.

The problem of determining the distribution of stress in the neighborhood of a crack in an infinitely long elastic strip is considered. It is assumed that the equations of the classical (infinitesimal) theory of elasticity hold and the width of the strip is times the length of the crack. The boundary conditions appropriate to two types of problems are formulated. The problem is reduced to the solution of a pair of dual integral equations. By reducing the dual integral equations to a single Fredholm equation of the second kind, analytical expressions are derived for the solution in the case of large values of delta. Expressions are then calculated up to the order delta to the minus sixth power for the shape of the deformed cracks and for the crack energy. Expressions are derived for complex potential functions. (Author)

AD-411 955 Div. 25
(TISTP/MFA) OTS price $3.60

Coordinated Science Lab., U. of Illinois, Urbana.
ATOMIC PROCESSES IN HELIUM-KRYPTON AND HELIUM-XENON MIXTURES,
by C. L. Chen. June 63, 31p. R171
Contract DA36 039AMC02208, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Helium group gases, Atomic properties), (*Pressure, Measurement), Helium, Krypton, Xenon, Plasma physics, Microwaves, Gas ionization, Electrical conductance, Differential cross section, Attenuation, Scattering, Energy schemes, Electron density.

The momentum transfer collision frequency of thermal electrons with neutrals in a decaying plasma established in helium-krypton and helium-xenon mixtures of known proportions were measured by microwave interferometer at gas temperatures of ~200 to 600 K. Mobilities of Kr and Xe in helium and in their respective parent gas have also been determined, from the characteristic time constants of the electron density decay measured in the afterglow in the mixtures at low pressures, to be: mu(Kr+ in He) = 2.02 ± 1.2 cm2/volt-sec, mu(Kr+ in Kr) = 1.01 ± 0.06, mu(Xe+ in He) = 18 ± 1.1 and mu(Xe+ in Xe) =

0.55 ± 0.03 at ~300 K. A study of the pressure dependence of the characteristic time constants of the elctron density decay at fixed ratios of krypton to helium and xenon to helium concentrations yields the three body conversion frequency of atomic krypton and xenon ions to their respective molecular ions. (Author)

AD-411 968 Div. 25
(TISTP/RLG) OTS price $11.50

Stanford U., Calif.
HEAT TRANSFER IN A RECIPROCATING HOLLOW CYLINDER PARTIALLY FILLED WITH A LIQUID,
by John E. Bush. Apr 63, 143p. Technical rept. no. 56
Contract Nonr22523, Proj. NR090 342
Unclassified report

Descriptors: (*Heat transfer, Pistons), Cooling, Internal combustion engines, Design, Liquids, Analysis, Mathematical models, Thermal conductivity, Convection, Experimental data, Correlation techniques, Equations, Diesel engines, Photographs, Fluid dynamic properties, Temperature, Oils, Sodium, Water.

Interest in techniques of cooling the pistons of highly supercharged reciprocating internal combustion engines has revealed the need for basic design information relating to heat transfer in a hollow reciprocating piston partially filled with a liquid. Analyses based on a conductive model and on a convective model for heat transfer are developed to identify the governing nondimensional parameters. Experimental data supports the conclusion that a convective mechanism of heat transfer predominates. Two correlating equations, based on experimental data, have been obtained. These correlating equations can be used in the design of internal combustion engine pistons and valves which are cooled by cocktail shaking. An illustrative application of the correlating equations to the cooling of a highly supercharged diesel engine piston is presented. (Author)

AD-411 974 Div. 25, 30
(TISTM/BRW) OTS price $1.25

Imperial Coll. of Science and Tech., London (Gt. Brit.).
A VERSATILE APPARATUS FOR THE STUDY OF REFRACTORY INDEX FIELDS IN GASES,
by F. J. Weinberg. Feb 63, 33p.
Contract AF33 616 7022, Proj. 7013, Task 7013 04
ARL 63 45 Unclassified report

Report on Research in Chemical Energetics.

Descriptors: (*Gases, Refractive index), (*Optical instruments, Design), Interferometers, Schlieren photography, Instrumentation.

A relatively inexpensive optical system is described which is capable of interferometry, deflection mapping, shadowgraphy and the entire range of schlieren recording. It is easy to set up, requires only minor adjustments to convert it from one function to another and, when desired, can fulfill several of them simultaneously. Its construction is discussed and illustrated by a variety of records. (Author)

AD-411 982 Div. 25, 10, 4, 30
(TISTM/EJH) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
QUANTUM MECHANICS OF HO2. I. GROUP THEORY AND COORDINATE TRANSFORMATIONS,
by D. S. Villars. June 63, 34p.
NOTS; NAVWEPS Rept. no. TP 3227; 8134
Unclassified report

Descriptors: (*Combustion, Free radicals), (*Free radicals, Combustion), (*Stability, Free radicals), (*Quantum mechanics, Free radicals), Integral equations, Programming (Computers), Spin, Electrons, Bonding, Atomic orbitals, Chemical reactions, Oxygen compounds, Hydrogen compounds.

This report outlines the rigorous quantum mechanical steps required to solve the problem of stability of the reaction intermediate HO2 and points out where approximations may be introduced to enable one to overcome the computational difficulties. Symmetry group representations applicable to this radical are described. Coordinate transformation matrices are set up to provide a machine computational method of converting from the coordinate system used for computing the quantum mechanical integrals to the system appropriate to the symmetry groups of the triatomic unsymmetrical radical. A procedure for machine orthogonalization of the wave functions is developed. Reduction of the total number of configurations required for consideration is principally achieved by setting up linear combinations of orbitals to correspond to bonding and antibonding and preassigning electrons by pairs to the bonding and none to the antibonding. The relationship of bond angle to degree of hybridization is developed. (Author)

AD-411 988 Div. 25
(TISTP/MFA) OTS price $1.60

Queen's U., Belfast (Gt. Brit.).
THE DIPOLE POLARIZABILITY OF MEMBERS OF THE LITHIUM SEQUENCE,
by M. R. Flannery and A. L. Stewart. 1963, 12p.
Grant AF EOARDC61 16
AFCRL 63 699 Unclassified report

Descriptors: (*Lithium, Polarization), (*Atomic orbitals, Functional analysis), Determinants, Measurement, Dipole moments, Perturbation theory, Electrons.

The dipole polarizabilities of normal Li, Be, and F have been determined using perturbed and unperturbed wave functions of the open shell type. The result for lithium alpha = 25.1 x 10 to the -24th power cu cm is in agreement with previous theoretical estimates but slightly in excess of the measurement alpha = 22 ± 2 x 10 to the -24th power cu cm of Chamberlain and Zorn (1963). (Author)

AD-411 993 Div. 25
(TISTP/RLG) OTS price $5.60

Aeronautical Instruments Lab., Naval Air Development Center, Johnsville, Pa.
VIBRATION PICK-UPS THEORY AND CALIBRATION,
by Lloyd G. Blades. 24 June 63, 1v.
NADC AI6310 Unclassified report

Descriptors: (*Monitors, Tests), (*Vibration, Turbojet engines), Aircraft, Effectiveness, Theory, Test equipment, Test equipment (Electronics), Vibrators (Mechanical), Frequency, Amplifiers, Indicator lights, Errors, Electric terminals, Calibration, Temperature, Measurement, Velocity, Sensitivity, Analysis.

This report contains technical information concerning the theory, testing, and characteristics of vibration type pick-ups intended for use on turbine type aircraft engines. Test results on some typical vibration pick-ups and test equipment are included. (Author)

AD-412 253 Div. 25
(TISTP/JP) OTS price $5.60

California Inst. of Tech., Pasadena.
RADIATION DUE TO THE RADIAL MOTION OF A CONDUCTING SPHERE IN A MAGNETIC FIELD,
by Giulio Venezian. June 63, 43p. Rept. no. 85 25
Contract Nonr22028
Unclassified report

Descriptors: (*Plasma oscillations, Mathematical models), (*Nuclear explosions, Electromagnetic fields), (*Terrestrial magnetism, Plasma oscillations), Plasma physics, Magnetic fields, Electric currents, Spheres, Electrical conductance, Superaerodynamics, Partial differential equations, Boundary value problems, Oscillation, Energy, Electromagnetic waves, Plasma medium, Vacuum.

The electromagnetic fields resulting from the radial motion of a perfectly conducting sphere in a uniform magnetic field are studied. Expressions for the radiated power are obtained for the cases of a sphere expanding or contracting at a uniform rate, for a sphere oscillating between two radii at a uniform speed, and for a sphere undergoing small amplitude oscillations. The effects of finite amplitudes are examined. These problems have applications in the study of the expansion of a plasma cloud in a magnetic field. (Author)

AD-412 276 Div. 25
(TISTP/MFA) OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EFFECT OF MICROWAVE RADIATION ON THE IONIZED GAS BEHIND A STRONG NORMAL SHOCK WAVE,
by K. T. Yen. July 63, 19p. Rept. no. R63SD60
Contract AF30 602 1968
Unclassified report

Descriptors: (*Shock waves, Microwaves), (*Gas ionization, Phasma medium), Numerical analysis, Propagation, Reflection, Gas flow, Thermodynamics, Pressure, Density, Temperature, Heating, Equations of state, Energy, Differential equations.

An analytical study of the interaction between microwaves and a fully-ionized gas behind a normal shock wave is presented. The governing differential equations derived by a quasi-steady analysis are used to obtain the non-dimensional parameters and integrated to yield the ''first integrals'' of the momentum and energy equations. A modified Prandtl relation is derived from which the final equilibrium state of the ionized gas can be found. Ionization is seen to increase the final equilibrium density, while microwave heating tends to reduce its value. It is further shown that thermal choking of the ionized gas occurs at a critical microwave power level, which is a function of the Mach number ahead of the shock wave, the reflection coefficient of the microwave, and the ionization potential expressed in terms of the neutral gas temperature ahead of the shock wave. (Author)

AD-412 277 Div. 25, 15
(TISTP/MFA) OTS price $9.60

Johns Hopkins U., Baltimore, Md.
CLUSTER-EXPANSION CORRECTIONS TO THE DEBYE-HUCKEL PAIR-CORRELATION FUNCTION FOR IONIZED GASES.
Technical rept. no. 1,
by Charles F. Hooper, Jr. June 63, 112p.
Contract Nonr24857, Proj. NR012 304/8 13 62
Unclassified report

Descriptors: (*Plasma medium, Distribution theory), (*Gas ionization, Analysis), (*Correlation techniques, Functions), Line spectrum, Particle spectra, Bessel functions, Fourier analysis, Integral transforms, Electric fields, Particles, Integration, Electrons, Shielding, Perturbation theory.

The Kolb-Griem theory of spectral line broadening occurring in plasmas is discussed; emphasis is placed on the importance of the electric microfield distribution. The Mozer-Baranger calculation of the electric microfield distribution in a plasma is outlined; its dependence upon the nature of the component particle correlations is shown. The electrons and ions must be treated separately because of their inherent differences; the electrons interact through a Coulomb field, whereas the ions interact with shielded fields. The Salpeter cluster-expansion technique is considered in detail. It is applied to the determination of pair correlation functions and the corresponding potentials of mean force for both Coulomb and shielded fields. (Author)

AD-412 292 Div. 25
(TISTP/RLG) OTS price $.75

Southampton U. (Gt. Brit.).
THE RESPONSE OF A MODEL STRUCTURE TO NOISE.
PART II CURVED PANEL.
Interim rept.
May 63, 21p.
Contract AF61 052 504, Proj. 7351, Task 735106
ASD TDR62 706, pt. 2 Unclassified report

Descriptors: (*Noise, Mechanics), (*Panels, Curved profiles), Sheets, Vibration, Vector analysis, Pressure, Theory, Sound, Energy, Stresses, Model tests, Frequency, Experimental data, Analysis.

A model structure consisting of a curved sheet of area 4 ft x 6 ft and radius 4 ft, subdivided into small regular panels by frames and stringers, has been excited by discrete frequency sound. The response of a row of panels between two frames has been studied in detail and the stringer twisting and bending modes have been identified. These form respectively the lower and upper bounds of a group of modes. Polar plots of the response vector relative to the exciting pressure have been used to identify the intermediate modes which have significant response to acoustic plane wave excitation. Many such modes, close together in frequency, have been shown to exist. A theoretical analysis based on the energy method and using the mode shapes derived for the flat panel gives a reasonable approximation to the upper and lower bounds of the group of modes. An estimation of the stress in the upper bounding mode gives an order of magnitude agreement with the experimental results. (Author)

AD-412 302 Div. 25
(TISTP/WH) OTS price $11.50

High Velocity Lab., U. of Utah, Salt Lake City.
WAVE FRONT SOLUTIONS IN LINEAR AND NONLINEAR MEDIA,
by C. U'CDermott and Neil P. Bailey.
May 63, 1v. Technical rept. UU 12
Contract AF04 694 259
BSD TDR63 131 Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Elasticity, Solids), Stresses, Measurement, Digital computers, Strain gages, Algebra, Partial differential equations.

A study was made of plane, cylindrical and spherical wave fronts in linear and nonlinear media caused by either a constant velocity or constant pressure impact condition. The classical wave equations were analyzed and stress times area times velocity (SAV) was found to be constant at the wave front. This allowed reducing the wave front solutions to simple algebra. Strain gage measurements were used to verify the theory. (Author)

AD-412 308 Div. 25
(TISTM/EJH) OTS price $1.10

Pittsburgh U., Pa.
INVESTIGATIONS OF VIBRATION-ROTATION LINE STRENGTHS AND WIDTHS IN HCl AND HI.
Final rept.,
by William Benesch. May 63, 11p.
Contract AF19 604 6138, Proj. 8603, Task 86033
AFCRL 63 667 Unclassified report

Descriptors: (*Chlorides, Spectra (Infrared)), (*Iodides, Spectra (Infrared)), (*Spectra (Infrared), Halides), (*Molecular spectroscopy, Halides), (*Abstracts, Molecular spectroscopy), Atomic spectroscopy, Kinetic theory, Absorption spectra, Interferometers, Gases, Hydrogen compounds, Vibration, Rotation.

AD-412 313 Div. 25
(TISTP/JP) OTS price $1.60

Naval Research Lab., Washington, D. C.
TRANSMISSION OF RUBY LASER LIGHT THROUGH WATER,
by J. A. Curcio and G. L. Knestrick. 18 June 63, 11p.
Proj. RR004 02 42 5152
NRL Rept. no. 5941 Unclassified report

Descriptors: (*Lasers, Underwater light), (*Water, Light transmission), Ruby, Attenuation, Scattering.

The attenuation coefficients of filtered Potomac River water were measured at the ruby laser wavelength, 6943A, and at three wavelengths in the green region of the spectrum where the attenuation is near the minimum. The tests were conducted in situ at the David Taylor Model Basin. The path of the light beam, which was at a depth of 2.2 m, was varied from 6 to 36 m in the laser light observations and from 15 to 73 m for the green light observations. Narrow-band filters were used to restrict the passband of the system, and the field of view of the receiver was limited to 1.2 degrees. The attenuation coefficient obtained at 6943A was .00545/cm and the value obtained at 4900A was .00086/cm. Evidence was found for some small particle scattering. As an underwater light source, the ruby laser is severely handicapped by the fact that its emission occurs at a wavelength which is highly attenuated by water. (Author)

AD-412 324 Div. 25
(TISTP/WH) OTS price $7.60

Columbia U., New York.
LONGITUDINAL IMPACT OF A SEMI-INFINITE CYLINDRICAL VISCOELASTIC SHELL,
by R. B. Testa and H. H. Bleich. June 63, 65p.
Technical rept. no. 16; Rept. no. CU2 630NR266 34CE
Contract Nonr26634, Proj. NR064 417
Unclassified report

Descriptors: (*Impact shock, Elastic shells), (*Viscoelasticity, Impact shock), (*Elastic shells, Viscoelasticity), Membranes, Integral transforms, Numerical analysis, Stresses, Cylindrical bodies, Rods, Vibration.

The response generated by the longitudinal impact of a semi-infinite, cylindrical, viscoelastic shell is investigated on the basis of membrane theory. Laplace transform methods are applied and asymptotic values of the axial stress are determined for large values of a nondimensional time. A real integral which appears in the asymptotic expressions is evaluated numerically and tabulated as a function of two parameters. In the equivalent elastic problem, oscillatory solutions were obtained with peak values of the stress exceeding those found in the impact of a thin elastic rod. The present study indicates that the oscillations and overshoots no longer occur in the asymptotic solution for a viscoelastic material. The results obtained also give the asymptotic solution for a viscoelastic rod. (Author)

AD-412 325 Div. 25
(TISTM/TCG) OTS price $2.60

Massachusetts Inst. of Tech., Cambridge.
THE THERMAL CONDUCTIVITY OF NITROGEN AND ARGON,
by Robert G. Vines and Frederick G. Keyes.
July 63, 22p. Proj. Squid TR MIT34P
Unclassified report

In cooperation with Virginia U., Charlottesville,
Contract Nonr-362300, Proj. NR098-038.

Descriptors: (*Nitrogen, Thermal conductivity), (*Argon, Thermal conductivity), (*Thermal conductivity, Gases), Pressure, Density, Tables.

AD-412 326 Div. 25
(TISTM/REB) OTS price $2.40

Mississippi U., University.
THE EFFECT OF LIGHT MOLECULES ON VIBRATIONAL RELAXATION IN OXYGEN.
Technical rept.,
by F. D. Shields and K. P. Lee. 18 July 63, 22p.
Contract Nonr3078 00
Unclassified report

Report on Thermal Relaxation Processes in Gases.

Descriptors: (*Gases, Molecular properties), (*Oxygen, Molecular properties), Molecules, Sound, Absorption, Velocity, Measurement, Hydrogen, Deuterium, Helium, Relaxation time, Temperature, Vibration.

Sound absorption and velocity measurements have been made in O2 with added amounts of H2, D2 and He. The number of collisions, Z sub 10(AB), necessary to de-excite the first vibrational state of O2 has been calculated from the measured relacation times. These values are in general agreement with values reported by Parker; Holmes, Smith, and Tempest; and White and Millikan. When log Z sub 10 (AB) is plotted vs the cube root of the reduced mass times the square of the vibrational frequency divided by the absolute temperature a linear relationship is found between the O2-H2 and the O2-He data. However Z sub 10 (O2-D2) is unexpectedly longer than Z sub 10 (O2-He). When the collision numbers, Z sub 10, for pure O2 and N2 are plot in this way they fall along a single curve. (Author)

AD-412 361 Div. 25, 9
(TISTP/MFA) OTS price $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
EXPERIMENTS ON SHOCK RELAXATION IN PARTICLE SUSPENSIONS IN A GAS AND PRELIMINARY DETERMINATION OF PARTICLE DRAG COEFFICIENTS,
by George Rudinger. July 63, 17p. Proj. SQUID; TR CAL90P
Proj. NR098 038
Unclassified report

In cooperation with Virginia U., Charlottesville, Contract Nonr362300.

Descriptors: (*Shock waves, Theory), (*Shock tubes, Particles), Viscosity, Density, Pressure, Velocity, Electrostatics, Fluid flow, Drag, Particle trajectories.

A shock-tube technique is used to investigate the flow conditions behine a shock wave propagating through a suspension of small solid particles in a gas. With the aid of a particle injector system, the driven section of the shock tube can be filled with a reasonably uniform suspension of known composition. The particles are rapidly accelerated behind a shock, and their motion is recorded by steak photography; in addition, the shock velocity and the pressure variations at one point of the test section are obtained. The flow conditions in the relaxation zone behind the shock wave can be derived from these measurements and the data are used to obtain the relationship between drag coefficient and particle Reynolds number. In the experiments conducted so far, 29-micro particles were used, and the particle Reynolds numbers were below 300. All data are well correlated by C sub D - 6000/Re1.7. This relationship deviates strongly from conventionally used correlations, and it is suspected that electric charges on the particles may cause such a discrepancy if the particles are as small as those used in the present experiments. The actual mechanism of the effect has not yet been explained. (Author)

AD-412 362 Div. 25, 4
(TISTM/REB) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
TRANSIENT HEAT-TRANSFER MEASUREMENTS OF CATALYTIC RECOMBINATION IN A STEP-FUNCTION FLOW OF ATOMIC OXYGEN.
Interim rept.,
by A. L. Myerson. Aug 62, 33p. AF1412A2
Contract AF49 638 782
AFOSR 3203 Unclassified report

Descriptors: (*Recombination reactions, Heat transfer), (*Oxygen, Recombination reactions), (*Heat transfer, Measurement), Resistance thermometers, Films, Catalysis, Atoms, Surfaces, Platinum, Subsonic flow.

Heat transfer measurements were made by means of thin-film resistance thermometry which show simultaneously, catalytic and noncatalytic transient heating. These transients are observed with millisecond resolution during a well-defined step-function of atomic oxygen concentration in a subsonic flow. The differences are observable because of the short response time of the probe and are thus in significant contrast with the behavior determined by the extant steady-state techniques. Differences in the behavior of the heat-transfer rate as a function of time are noted for conditioned and unconditioned surfaces. (Author)

AD-412 406 Div. 25
(TISTM/BRW) Ots price $1.60

Kansas State U., Manhattan.
STUDY OF HEAT TRANSFER BETWEEN A FLAT PLATE AND A PULSATING, IMPINGING JET,
Final rept., 26 Mar 59 - 31 Aug 62.
by Ralph G. Nevins and Herbert D. Ball, 1 Jun 63, 14p.
Contract No. DA-23-072-ORD-1415 AROD Project No. 2327; KEES Project No. 2280
AROD 2327-2
Unclassified report

Descriptors: (*Metal plates, Heat transfer), (*Cooling, Water impingement), (*Water impingement, Jets), Experimental data, Disks, Copper, Steam, Enthalpy, Film cooling.

An investigation was made to obtain heat transfer data for unsteady forced convection cooling of a flat plate by an impinging water jet. The data are for jet velocities up to 250F, pulsation frequencies of 1, 3 and 5 cps and impingement angles of 90, 60 and 30 degrees from the horizontal. (Author)

AD-412 409 Div. 25
(TISTP/WH) OTS price $1.60

Brown U., Providence, R. I.
EQUILIBRIUM OF EXTENDED DISLOCATIONS WITHIN EDGE DISLOCATION DIPOLES,
by H. S. Chen, J. J. Gilman, A. K. Head. June 63, 14p. Technical rept. no. 5
Contract Nonr56232
Unclassified report

Descriptors: (*Crystal lattice defects, Elasticity), (*Crystal structure, Fracture (Mechanics)), Surface tension, Metallic crystals.

It is shown that extended edge dislocations tend to contract into unit dilocations when they are components of a dipole (pair of opposite signs). If the half-width of an isolated extended dislocation is s, rapid contract begins when the dipole glide-plane space becomes less than about 2S. (Author)

AD-412 421 Div. 25
(TISTP/JP) OTS price $8.60

Cornell U., Ithaca, N. Y.
THE PHOTOIONIZATION CROSS SECTION OF NEON FROM 80A TO 600A,
by D. L. Ederer. June 63, 95p. Technical rept. no. 10
Contract Nonr40137, Proj. NR017 625
Unclassified report

Descriptors: (*Neon, Photoelectric effect), (*Molecular spectroscopy, Neon), (*Absorption spectra, Ultraviolet radiation), (*Gas discharges, Ultraviolet radiation), Photoelectrons, Photons, Ionization potentials.

Contents:
Theory of the photoelectric effect
Experimental procedures
Photometric measurements with a normal and a grazing incidence spectrograph
The measurements with the GM counter
The treatment of data and the discussion of error

AD-412 429 Div. 25
(TISTP/RLG) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
MAGNETIC STUDIES OF IRRADIATED HEMATITE CRYSTALS.
Annual technical rept.
by Robert E. Ogilvie. 22 July 63, 13p.
Contract Nonr1841 84, Proj. NR031 686
Unclassified report

Descriptors: (*Antiferromagnetism, Single crystals), (*Crystal lattice defects, Ferromagnetism), Magnetic properties, Transition temperature, Magnetic moments, Impurities, Anisotropy, Fluxes (Fusion), Hysteresis, Measurement.

AD-412 458 Div. 25, 4
(TISTM/REB) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
A LITERATURE SURVEY ON THE PURIFICATION OF ELECTRONIC MATERIALS,
by A. F. Armington, G. F. Dillon, and R. F. Mitchell. June 63, 36p.
Proj. 5620
AFCRL 63 160 Unclassified report

Descriptors: (*Semiconductor, Materials), (*Bibliographies, Semiconductor), (*Purification, Semiconductors), (*Electronics, Materials), Aluminum, Antimony, Arsenic, Bismuth, Boron, Cadmium, Gallium, Germanium, Indium, Lead, Magnesium, Mercury, Phosphorus, Selenium, Silicon, Sulfur, Tellurium, Tin, Zinc.

This report, the second in a series under the general title of purification, is a literature survey on the purification procedures applied to nineteen elements used in the electronic industry. There is an additional section on the attainment of stoichiometry in compound semiconductors by the industry and a summary chart of the probable best purification procedure for each element. (Author)

AD-412 461 Div. 25, 8, 6
(TISTP/FEM) OTS price $2.60

Naval Applied Science Lab., Brooklyn, N. Y.
PORTABLE SURVEY METER FOR MEASUREMENT OF X-RAY HAZARDS ASSOCIATED WITH RADAR (X-RAY HAZARD METER).
Progress rept. no. 4,
by C. Christianson, L. Mackay and E. Duffy.
28 June 63, 1v.
Subproject SF011 05 04, Task 6007
NASL Rept. no. 5115 4 2, Pt. 12
Unclassified report

Descriptors: (*X rays, Hazards), (*Radar pulses, X rays), (*Detectors, X rays), Scintillation counters, Phosphorus, Energy, Dose rates, Magnetic fields, Measurement, Shielding, Electromagnetic fields, Metals, Tables, Thickness, Electric fields, Circuits, Photomultipliers, Absorption, Copper.

Investigations of various techniques and methods for measurement of pulsed x-radiation from radar established the scintillation technique to be the most feasible. Research on various scintillation phosphors resulted in the development of a unique dual-phosphor scintillation detector. Utilizing an RCA 6199 PM tube and the dual phosphor (wafers of Pilot B and lucite loaded with silver-activated zinc sulphide) energy independence for effective energies of 20 Kev to 1.3 Mev is achieved to within + or - 15%. Four ranges (5, 50, 500 and 5000 mr/hr) are provided to measure pulsed X-ray doses from radars. For a radar (1 microsec pulse width, 200 pps repetition rate) the instrument can measure peak X-ray dose rates of 25, 250, 2500 and 25,000 r/hr without saturation. The instrument is insensitive to microwave radiation in the X band region up to 50 milliwatts/sq cm and to magnetic fields up to one gauss at 30 Kc/s. The probe is provided with arc-over protection. A prototype model, under development by the Material Laboratory, is described. (Author)

AD-412 462 Div. 25, 8
(TISTM/REB) OTS price $3.60

Hughes Aircraft Co., Culver City, Calif.
ANALYSIS OF FAILURE MECHANISMS WITH HIGH ENERGY RADIATION.
Quarterly rept. no. 1, 1 Jan-31 Mar 62,
by C. B. Schoch and V. R. Honnold. 1 Apr 62, 32p.
Contract AF30 602 2596, Proj. 5519, Task 551902
RADC TDR62 269 Unclassified report

Descriptors: (*Semiconductors, Radiation damage), (*Diodes (Semiconductor), Failure (Mechanics)), Germanium alloys, Silicon alloys, Nuclear magnetic resonance, Paramagnetic resonance, Tracer studies, Neutron activation, Analysis, Surface properties, Gamma rays.

This program is being conducted to analyze and identify specific modes of failure in semiconductor materials, semiconductor devices, and insulating materials with the use of high-energy radiation. During the first three months of this contract a literature search was conducted with particular emphasis on radiation effects in semiconductors; a program outline for the remainder of the contract was established, and a preliminary experimental program on the effects of gamma radiation on germanium and silicon diodes was partially completed. Special tools for analysis of the structure of materials, such as nuclear-magnetic resonance and electron-paramagnetic resonance are under development and will be applied as soon as they become available. (Author)

AD-412 503 Div. 25, 2
(TISTP/MFA) OTS price $4.60

Towne School of Civil and Mechanical Engineering, U. of Pensylvania, Philadelphia.
THEORY OF MECHANICAL BEHAVIOR OF HETEROGENEOUS MEDIA,
by Zvi Hashin. July 63, 39p. Technical rept. no. 3
Contract Nonr551 42, Proj. NR064 458
Unclassified report

Descriptors: (*Crystals, Mechanical properties), (*Elasticity, Analysis), Statistical mechanics, Stresses, Polarization, Tensor analysis, Phase studies, Viscosity, Continuum mechanics, Theory, Bibliographies, Shear stresses, Crystal lattices, Plasticity, Anisotropy.

Theoretical methods and results are reviewed in the field of prediction of bulk mechanical properties of heterogeneous media, in terms of mechanical properties and geometry of constituents. The term heterogeneous medium is here understood as a mixture of discrete homogeneous phases which form regions that are large enough to be regarded as continua. The mechanical behavior of each phase is known in terms of stress-strain relations and at phase interfaces usual continuity conditions on stress vectors and displacements (or velocities) are specified. (Author)

AD-412 506 Div. 25
(TISTP/MFA) OTS price $10.10

Yale U., Observatory, New Haven, Conn.
COULOMB INTERACTIONS IN A STRONG MAGNETIC FIELD.
Interim technical rept.,
by Robert Goldman and Ludwig Oster. May 63, 117p.
Contract AF33 616 7271, Proj. 7073, Task 7073 01
ARL 63 90 Unclassified report

Report on Research in Plasma Dynamics.

Descriptors: (*Cyclotron waves, Charged particles), (*Magnetic fields, Analysis), (*Plasma medium, Line spectrum), Emissivity, Tensor analysis, Particle trajectories, Transport properties, Scattering, Polynomials, Probability, Diffusion.

From the adiabatic spectral line theory of Lindholm and the generalized quantum treatment of pressure effects by Anderson, we derive an expression for the emission spectrum of cyclotron radiation from free charged particles in typical plasma situations. After adapting the formalism to account for the continuous nature of the energy states parallel to the magnetic field, and after including the energy dependence of the dipole matrix element, one obtains shift and half-width values for the cyclotron line in the case of a strong magnetic field. Extension to the weak field case can then be made in a plausible manner, resulting in the ordinary Coulomb cross section for vanishing magnetic field strength. (Author)

AD-412 526 Div. 25
(TISTP/MFA) OTS price $4.60

Maryland U., College Park.
LOCALIZED MODE DETECTION BY MEANS OF THE MOSSBAUER EFFECT.
by Alvin David Dinhofer. June 63, 39p. Technical rept. no. 312
Grant AF AFOSR62 46
AFOSR 5139 Unclassified report

Doctoral thesis.

Descriptors: (*Crystal lattice defects, Vibration), (*Mossbauer effect, Light), Symmetry (Crystallography), Phonons, Equations, Attenuation, Green's function, Single crystals, Oscillation, Operators (Mathematics), Absorption, Propagation, Impurities, Perturbation theory, Photons, Brillouin zones, Electromagnetic fields.

Defects or impurities have nuclei for which a Mossbauer effect has been observed. Since such nuclei are not light nuclei, one would not expect to find them in host crystal composed of isotopes of much greater relative mass, as would be necessary, in three dimensions for the appearance of a localized mode. These impurities would therefore be more correctly described as being connected to their neighbors by forces which are not of the same strength as those between host atoms. But, in considering the detectability of LM's by means of the Mossbauer effect, we may deal only with the isotopic case, because the relevant cross section depends upon the spatial attenuation of the LM, which a wide range of force constants will maintain. (Author)

AD-412 546 Div. 25, 14
(TISTM/AMS) OTS price $2.60

Spectrolab Inc., North Hollywood, Calif.
DESIGN AND FABRICATION OF OPTICAL FILTERS FOR LASER FREQUENCY.
Quarterly progress rept. no. 1, 11 Feb-9 May 63,
by Samuel J. Holmes and Noel Bowman. 24 May 63, 21p.
Contract AF33 6570 9216
Unclassified report

Descriptors: (*Optical filters, Narrowband), Theory, Lasers, Mica, Dielectric films, Reflection, Optical properties, Absorption, Vapor plating, Data, Wave transmission, Mathematical analysis, Manufacturing methods, Zinc compounds, Sulfides, Interference, Pressure, Vacuum apparatus, Design.

In approaching the task of fabricating very narrow band interference filters, Spectrolab has directed its efforts during the past quarter towards the understanding of the causes and effects of film inhomogenities. For many materials, the conditions under which a vacuum deposited film is prepared have been found to have a pronounced effect on its optical properties. Therefore, the effects of pressure and deposition rates were studied. Uniform films over a relatively large area have been obtained for constant pressure at 5 x 1/100,000 mm Hg. However, it is felt that even better uniformity could be obtained at pressures below 1 x 1/100,000 mm Hg. Also, because the amount of absorption in zinc sulfide films varies with the rate of deposition, some effort was devoted to find an optimum rate at which to deposit the films having the smallest amount of absorption. Preliminary results have proven that a rate of approximately 20 angstroms/sec. will produce films which are non-absorbing in the visible. (Author)

AD-412 551 Div. 25, 15
(TISTP/FEM) OTS price $2.60

North Carolina State Coll., Raleigh.
PRIMARY RESONANT OSCILLATIONS OF A CONSERVATIVE SYSTEM WITH TWO DEGREES OF FREEDOM.
Master's thesis,
by Grover Karl Warmbrod. 1963, 25p.
Unclassified report

Descriptors: (*Nonlinear systems, Resonance), (*Oscillation, Springs), Harmonic oscillators, Trigonometry, Operators (Mathematics), Differential equations, Analysis of variance, Trajectories, Damping, Transformations.

The free oscillations of an idealized system consisting of two masses each anchored by a nonlinear spring and coupled by a nonlinear spring are analyzed. The springs aare assumed to be of Duffing type, that each mass possessing a single degree of freedom of translation, and that the translations of the masses are collinear. (Author)

AD-412 552 Div. 25, 15
(TISTP/FEM) OTS price $2.60

North Carolina State Coll., Raleigh.
A STUDY OF THE EFFECTS OF DAMPING ON NONLINEAR OSCILLATIONS.
by Thomas Cooper Harris. 1963, 25p.
Unclassified report

Master's thesis.

Descriptors: (*Nonlinear systems, Damping), (*Damping, Harmonic oscillators), Nonlinear differential equations, Perturbation theory, Oscillation, Motion, Integrals.

The effects of damping in specific nonlinear systems are discussed. A method for obtaining quantitative information about the free oscillations of certain damped systems is illustrated. (Author)

AD-412 635 Div. 25
(TISTM/EJH) OTS price $.50

Naval Research Lab., Washington, D. C.
PROPOSED PHASE DIAGRAM FOR THE SYSTEM VANADIUM PENTOXIDE - ZINC OXIDE,
by A. J. Pollard. 1 July 63, 8p.
NRL 5960

Unclassified report

Descriptors: (*Phase studies, Zinc compounds), (*Vanadium compounds, Phase studies), (*Zinc compounds, Phase studies), (*Oxides, Phase studies), Crystallization, Crystals, Eutectics, Melting, X-ray diffraction analysis, High temperature research, Transition temperature.

The liquidus-solidus regions of the system V205-ZnO were investigated over the entire composition range, with the following principal findings. There are three congruently melting compounds: ZnO.V205 melting at 665 C, 2ZnO.V205 melting at 880 C, and 3ZnO.V205 melting at 897 C. There four eutectics, one at 23 mole percent V205 melting at 895 C, one at 27 mole percent V205 melting at 866 C, one at 46 mole percent V205 melting at 645 C, and one at 64 mole percent V205 melting at 634 C. (Author)

AD-412 643 Div. 25
(TISTP/WH) OTS price $1.60

Group for the Advancement of Spectroscopic Methods, G.A.M.S. (France).
RESEARCH ON BASIC FAR INFRARED TECHNIQUES.
Final rept.,
by Jean Lecomte and Armand Hadni. 15 Jan 63, 11p.
Contract AF61 052 137
AFCRL 63 832 Unclassified report

Descriptors: (*Infrared spectroscopy, Research program administration), Spectrophotometers, Diffraction gratings, Optical filters, Spectra (Infrared), Infrared detectors, Water vapor, Solids, Liquids.

AD-412 647 Div. 25, 8
(TISTM/AMS) OTS price $9.10

Hughes Aircraft Co., Culver City, Calif.
ANALYSIS OF FAILURE MECHANISMS WITH HIGH-ENERGY RADIATION.
Final rept., 1 Jan 62-31 Mar 63,
by R. L. Anthony, V. R. Honnold, and C. B. Schoch. 1 May 63, 95p.
Contract AF30 602 2596, Proj. 5519, Task 551906
RADC TDR63 226 Unclassified report

Descriptors: (*Semiconductors, Failure (Mechanics)). (*Failure (Mechanics). Test methods). Life expectancy, Radiation damage, Semiconductor devices, Gamma rays, Electrons, Cobalt, Silicon, Germanium, Diodes, Transistors, Vacuum apparatus, Thermal stresses, Brittleness, X-ray diffraction analysis, Gases, Dielectrics, Density, Analysis, Halocarbon plastics, Electric currents, Electric potential, Materials.

The effects of Cobalt 60 gamma radiation on good and failed silicon and germanium diodes, and on silicon PNP transistors, were investigated in some detail for accumulated doses up to 5 x 10 to the 7th power r. For the diodes, much greater changes in reverse current were produced in the failed units than in the good units by the irradiation. The results for the silicon PNP transistors were not as definite. Preliminary studies of the effects of varying the gas ambient upon the I-V characteristics of germanium diodes were made with the aid of a dry-type high vacuum system especially constructed for use on this contract. Reverse characteristics of good units were much more stable than those of failed units for ambient variations from dry air at 1 atmosphere to vacua of 2 x 10 to the -9th power Torr. A preliminary study was made of failure mechanisms in Teflon arising from thermal embrittlement. Cobalt 60 gamma radiation was used to accelerate the embrittlement process. The degree of crystallinity, believed to correlate with the embrittlement, was measured by x-ray diffraction and by hydrostatic weighing as a function of radiation dosage. (Author)

AD-412 659 Div. 25, 20
(TISTP/JP) OTS price $6.60

Michigan U., Coll. of Literature Science and the Arts, Ann Arbor.
ELASTIC SCATTERING OF NEGATIVE PIONS BY PROTONS AT BEV/C,
by D. E. Damouth, L. W. Jones and M. L. Perl.
June 63, 53p. Technical rept. no. 11; Rept. no. 03106 11T
Contract Nonr1224 23, Proj. 03106
Unclassified report

Descriptors: (*Pions, Elastic scattering), (*Nuclear scattering, Tests), Quantum mechanics, Meson bombardment, Proton scattering, Potential scattering, Enenergy, Resonance, Meson cross sections, Meson scattering, Diffraction, Resonance scattering, Protons, Photographic analysis, Mathematical analysis.

The negative pion-proton differential elastic cross section at an incident pion momentum of 2 Bev/c has been measured in a spark chamber experiment. Approximately 7000 events were obtained in the center of mass angular range .95 greater than cos theta asterisk greater than -.97. The data show an approximately exponential diffraction peak which when extrapolated to cos theta asterisk = 1.0 is consistent with the optical theorem prediction. A second peak, with a maximum of 23 mb/sr is seen at cos theta asterisk = .2. The backward scattering is not isotropic, but drops smoothly from .12 mb/sr at cos theta asterisk = 0 to about .01 mb/sr at the most backward angles. An analysis in terms of a simple diffraction model and a fit in powers of cos theta asterisk are given. (Author)

AD-412 667 Div. 25, 30
(TISTM/TCG) OTS price $1.60

College of Advanced Technology, Birmingham (Gt. Brit.).
ELECTRON AFFINITIES OF INORGANIC RADICALS.
Final technical rept. 1 Feb 62-31 Jan 63,
by F. M. Page. 31 Jan 63, 10p.
Contract DA91 591EUC2142
Unclassified report

Descriptors: (*Inorganic compounds, Ions), (*Ionization potentials, Inorganic compounds), Cyanides, Cyanates, Thiocyanates, Selenium compounds, Nitrogen compounds, Oxides, Carbon dioxide, Free radicals, Chemical bonds, Magnetrons, Test methods, Thermodynamics, Thermionic emission.

The magnetron technique for the determination of electron affinities has been applied to the study of certain inorganic radicals, with satisfactory results. The pseudohalogens, CN, OCH, SCN and SeCN have received careful and extensive study,

with varied success. Thiocyanogen (SCN)2 forms negative ions very readily, and the electron affinity is 49 kcals/mole. A comparison with the results from thiocyanic acid (HNCS) indicates that the H-N bond energy in the latter compound is 110 kcals/mole, distinctly higher than in ammonia. Cyanogen (CN)2 and hydrocyanic acid (HCN) yield values for the heat of formation of the CN(-) ion in close agreement, but the doubts recently cast on the heat of formation of the CN radical prevents this being expressed as an electron affinity. HNCO appeared to form CN(-) ions while (SeCN)2 and HSeCN were too unstable to study, although much time has been devoted to their preparation. The oxides CO2 and NO2 have been examined, and as a result, a considerable amount of work has been directed to the study of the thermionic work functions of oxidized filaments. (Author)

AD-412 671 Div. 25
(TISTP/WH) OTS price $1.10

Johns Hopkins U., Baltimore, Md.
THE SPECTRA OF DOUBLY AND TRIPLY IONIZED RARE EARTHS.
Final summary rept.,
by G. H. Dieke. 31 Dec 62, 2p.
Grant AFOSR62 238
AFOSR Rept. no. 4820 Unclassified report

Descriptors: (*Atomic energy levels, Rare earth elements), Ions, Atomic spectroscopy, Praseodymium, Ytterbium, Gadolinium, Ultraviolet radiation.

AD-412 673 Div. 25
(TISTP/FR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ON MEASURING THE POLARIZATION OF LIGHT IN FOG.
by T. P. Torpova. 2 Aug 63, 6p.
AID Rept., T63 102 Unclassified report

Trans. from Akademiya nauk Kazakhskoy SSR. Astrofizicheskiy institut. Trudy, pp. 144-148, 1962.

Descriptors: (*Light, Polarization), (*Fog, Light), Polarization, Scattering, Measurement.

AD-412 690 Div. 25
(TISTP/WH) OTS price $10.10

Purdue U., School of Aeronautical and Engineering Sciences, Lafayette, Ind.
ON THE STATIC NONLINEAR THEORY OF ELECTROMAGNETIC THERMOELASTIC SOLIDS,
by Neal F. Jordan and A. Cemal Eringen. July 63, 120p. Technical Rept. no. 21
Contract Nonr1100 23
Unclassified report

Descriptors: (*Solids, Physical properties), Enlectromagnetic properties, Mechanical properties, Loading (Mechanics), Electric fields, Deformation, Dielectrics, Tensor analysis, Thermal stresses, Nonlinear differential equations, Magnetostriction, Boundary value problems.

The basic field equations, boundary conditions, and constitutive equations, necessary for the treatment of problems concerning the nonlinear, steady state behavior of elastic solids subject to large deformations, electromagnetic fields and thermal gradients, are derived. The basic equations are formulated to include Maxwell's equations, laws of conservation of mass and of energy, and principles of balance of momentum and balance of moment of momentum. The constitutive equations characterize the stress, dielectric displacement, electric current, magnetic flux density, and heat flux as analytic tensor point functions of strain, electric field, magnetic field and thermal gradient for elastic solids displaying holohedral isotropy with respect to mechanical, electrical, magnetic and thermal properties. (Author)

AD-412 693 Div. 25
(TISTP/MS) OTS price $1.10

Pennsylvania U., Philadelphia.
REMARKS ON THE OGUCHI TRANSFORMATION,
by Raza A. Tahir-Kheli and Herbert B. Callen.
May 63, 8p. Technical rept. no. 11
Contract Nonr55136
Unclassified report

Descriptors: (*Quantum statistic, Transformations (Mathematics)), (*Mathematical models, Errors), (*Ferromagnetism, Mathematical models), (*Low temperature research, Mathematical models), Selection rules, Operators (Mathematics), Bosons, Ferromagnetic materials, Theory, Temperatures, Functions, Crystal lattices.

It is shown that the Oguchi transformation in the theory of ferromagnetism is a low-temperature spin wave approximation, the validity of which depends on the implicit assumption that the kinematical interaction can be ignored. This limitation has the consequence that the theory of Oguchi and Honma, if accepted at higher temperatures, predicts an infinite Curie temperature. (Author)

AD-412 709 Div. 25
(TISTP/MFA) OTS price $2.60

Cooley Electronics Lab., U. of Michigan, Ann Arbor.
EFFECT OF ELECTROMAGNETIC PROPAGATION ON THE MAGNETOSTATIC MODES,
by W. B. Ribbens. June 63, 23p. TR138; 4853 18T
Contract DA36 039SC89227, Proj. 3A99 06 001 01
Unclassified report

Descriptors: (*Electromagnetic fields, Propagation), (*Ferromagnetic materials, Magnetic properties), Ferrites, Tensor analysis, Green's function, Cylindrical bodies, Functions, Frequency, Resonance, Bessel functions.

The second-order effect of electromagnetic propagation on the esentially static-field distribution of the magnetostatic modes of a ferromagnetic sample is obtained by an iteration-type technique. It is found that the magnetostatic potential constitutes the source in a mathematical sense for a second-order correct field distribution. The internal sample fields are investigated for a ferrite cylinder enclosed between parallel conducting plates and they are found to consist of resonant modes whose frequencies are determined from a characteristic equation. These frequencies reduce to those of the magnetostatic modes in the limit of vanishingly-small wave numbers. For a nonzzero wave number the frequencies differ from the corresponding magnetostatic limits by an amount which depends on the sample shape. The resonant frequencies are size-dependent as contrasted to the size-independent magnetostatic modes. It was found that no resonant frequencies are possible above a critical value which depends on the spacing between the plates. A sample mode, whose resonant frequency is in a region forbidden to the magnetostatic modes, can exist if the sample size exceeds a critical value. (Author)

AD-412 714 Div. 25
(TISTP/MFA) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
MAGNETIC PROPERTIES OF CUPRON WIRE AT LOW TEMPERATURES.
by J. G. Daunt. July 63, 4p. Technical rept. no. 8
Contract N6onr 495 20, Projs. NR018 412; RF 989
Unclassified report

Descriptors: (*Wire, Magnetic properties), (*Magnetic moments, Measurement), Low temperature research, Alloys, Copper, Nickel, Ferromagnetism, Thermal conductivity.

AD-412 719 Div. 25, 30
(TISTM/EJH) OTS price $2.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
THE MAGNETIC SUSCEPTIBILITIES OF SEVERAL PARAMAGNETIC SALTS AT LIQUID HE3 TEMPERATURES,
by J. T. Schriempf and S. A. Friedberg.
26 July 63, 23p. TR17
Contract Nonr760 05NR018 301
Unclassified report

Descriptors: (*Paramagnetic materials, Magnetic properties), (*Organic compounds, Magnetic properties), (*Cryostats, Magnetic properties), Cryegenics, Hydrates, Chromium compounds, Nickel compounds, Manganese compounds, Complex compounds, Helium, Liquefied gases, Carboxylic acids, Measurement.

A cryostat is described in which magnetic susceptibility measurements may be made by an audio frequency mutual induction technique at temperatures down to 0.35 K. Below 2 K the specimens are in direct contact with liquid He-3. Results of measurements on several compounds are presented. The powder susceptibility of (Cr3(CH3C00)6(OH)2)C1.8H20 was found to obey a Curie-Weiss law and shows no evidence of intercluster coupling. Both powdered Co(C2H302)2.4H20 and powdered Ni(C2H302)2.420 are observed to be paramagnetic to the lowest temperatures attained; the former salt does not exhibit the anomaly at 0.6 K found in earlier studies employing a magnetic cooling technique. The powder susceptibility of Mn(CH02)2.2H20 departs somewhat from Curis-Weiss behavior at these temperatures, but no evidence was found of a cooperative transition above 0.56 K. (Author)

AD-412 727 Div. 25
(TISTP/JP) OTS price $11.00

General Electric Co., Philadelphia, Pa.
RADIATIVE CONTRIBUTIONS TO ENERGY AND MOMENTUM TRANSPORT IN A GAS,
by D. H. Sampson. 1 Aug 63, 144p. Document no. 63SD439
Contract AF04 694 222
Unclassified report

Descriptors: (*Gas flow, Transport properties), (*Photons, Energy), (*Thermodynamics, Photons), Mass energy relation, Quantum mechanics, Momentum.

The radiative contributions to energy and momentum transport in a gas are obtained for quite general conditions. In deriving the basic equations the particle or photon approach is used. This brings out the strong similarity to the derivation of the matter contributions to the energy and momentum transport equations by taking the appropriate moments of the material particle Boltzmann equations. The results for several limiting situations are studied. Some of the concepts of use in treating the radiation passing through a boundary or surface are discussed. A discussion is given of the approximation of local thermodynamic equilibrium and some of the special problems which arise when this approximation breaks down. (Author)

AD-412 735 Div. 25, 30
(TISTP/FEM) OTS price $9.60

Frick Chemical Lab., Princeton U., N. J.
FULL MATRIX LEAST SQUARES AND GENERAL FOURIER PROGRAMS FOR THE CONTROL DATA CORPORATION 1604 (CRYSTALLOGRAPHIC REFINEMENT),
by F. A. Muller and R. A. Jacobson. 17 June 63, 1v. Technical rept. no. 1
Grant DA AROD31 124G265, Proj. 3083C
Unclassified report

Descriptors: (*Least squares method, Computers), (*Programming (Computers), Crystal structure), (*Crystal structure, Analysis), Data processing systems, Electron density, Atoms, Matrix algebra, Symmetry (Crystallography), Control sequences, Input-output devices, Fourier analysis, Trigonometry, Taylor's series.

The over-all purpose of this program is speed, versatility, and convenience in the refinement stages of a crystal structure analysis. The least squares feature will refine either the difference Patterson function or the difference electron density function by solving the full matrix or the diagonal matrix approximation. It will operate on most space groups triclinic through orthorhombic although higher symmetry may be incorporated into an asymmetric unit of orthorhombic or lower symmetry. For convenience, the refinement aspects of the program are complimented by the automatic, in-memory availability of bond distances and angles, ellipsoids of vibration, and directly contourable Fourier and difference Fourier maps. In addition, various functions indicating the degrees of refinement are calculated. (Author)

AD-412 736 Div. 25, 17
(TISTM/AMS) OTS price $9.60

General Electric Co., Schenectady, N. Y.
RESEARCH ON CdTe.
Summary progress rept. no. 2, 1 May 62-30 Apr 63,
by M. R. Lorenz, R. E. Halsted, B. Segall, and D. T. F. Marple. 30 Apr 63, 1v.
Contract AF33 616 8264
Unclassified report

Descriptors: (*Cadmium alloys, Tellurium alloys), (*Tellurium alloys, Cadmium alloys), Hermetallic compounds, Semiconductors, Zinc alloys, Selenium alloys, Wave transmission, Refractive index, Optical properties, Electrical properties, Hall effect, Electron density, Magnetic fields, Dielectric properties, Magnetic properties, Single crystals, Fluorescence, Paramagnetic resonance, Chromium, Solid state physics, Spectroscopy, Radiation damage, Thermal stresses, Impurities, Experimental data, Analysis, Mathematical analysis, Photoelectric effect.

This report summarizes the results obtained during the second year of a program of basic research on CdTe. We have emphasized study of the electrical properties of n-type CdTe. Such information as the location of the conduction band minimum, the values of such fundamental param-

eters as electron effective mass, intrinsic electron mobility, and the nature of the mechanism of electron scattering were determined. Hall effect studies gave thermal transition energies for shallow, or hydrogenic, levels and several deeper defect levels near the conduction band edge in suitably prepared material. These energies could be correlated with optical energies found in luminescence studies of the same material. Similar correlations have also been found in other II-VI compounds. Considerable effort was expended in an attempt to identify some of the native defects and impurity centers and to study some properties associated with them. (Author)

AD-412 740 Div. 25
(TISTP/FEM) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
IBM 7090 FORTRAN PROGRAM FOR COMPUTING TEMPERATURES IN A COMPOSITE SLAB,
by Ethel G. Thomas and Walter P. Reid. 11 June 63, 50p.
NOL TR63 132; m 37 Unclassified report

Descriptors: (*Heat transfer, Programming languages), (*Programming (Computers), Heat transfer coefficients), (*Composite materials, Sheets), Functions, Temperature, Equations, Time, Ranges (Distance), Matrix algebra, Punched cards.

An IBM 7090 FORTRAN program has been written to compute linear heat flow in a 2-layer slab by means of an analytic solution. The temperatures computed are a function of both time and distance. Initial temperatures and heat generated are prescribed functions. Temperatures or heat flux can be given on either end. The equations used, the program, and some results are given. (Author)

AD-412 778 Div. 25, 15
(TISTP/MFA) OTS price $2.60

Brown U., Providence, R. I.
ON THE SOLUTION OF A TRANSCENDENTAL EQUATION ARISING IN THE THEORY OF SCATTERING BY A DIELECTRIC CYLINDER. PART II,
by William Streifer and Ralph D. Kodis. Aug 62, 25p. Scientific rept. no. 18
Contract AF19 604 4561, Proj. 5635, Task 563502
AFCRL 63 8 Unclassified report

Descriptors: (*Scattering, Theory). (*Dielectrics, Equations). Electromagnetic waves, Cylindrical bodies, Diffraction, Bessel functions, Taylor's series, Special functions (Mathematical).

Transcendental equations containing special functions arise in the theory of scattering by obstacles large compared to wavelength, when the Watson transformation is employed. (Author)

AD-412 799 Div. 25
(TISTP/MFA) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
ZEEMAN EFFECT IN GAS DISCHARGE LASERS,
by Rudolf G. Buser, Johann J. Kainz, and John J. Sullivan. June 63, 11p.
DA Task 3A99 25 003 05
USAELRDL TR2322A
Unclassified report

Descriptors: (*Lasers, Gas discharges), (*Emissivity, Measurement), Magnetic fields, Helium group gases, Helium, Neon, Polarization.

Recent measurements of the intensity of the emission of a gas discharge laser are discussed in terms of Zeeman effect. Results indicate that the observations, at least in part, can be accounted for by the latter. By application of magnetic fields it also seems possible to induce mode switching. (Author)

AD-412 810 Div. 25, 20
(TISTP/PCR) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
THE STABILITY OF THE POSITIVE COLUMN IN A TIME DEPENDENT MAGNETIC FIELD,
by Roy R. Johnson and David A. Jerde. Dec 62, 38p. Document no. D1 82 0218
Unclassified report

Also available from the author.

Descriptors: (*Plasma physics, Mathematical analysis), Magnetic fields, Stability, Equations, Electric fields, Ions, Electrons, Helium.

The stability of a weakly ionized plasma column in a longitudinal magnetic field containing a small time varying component is investigated, using a macroscopic approach previously developed by the authors for a static field. The time dependence of the field is taken to be linear, and its influence on the column given by the presence of the induced azimuthal electric field. A dispersion relation is derived from the linearized equations of continuity and momentum conservation for the ions and electrons, from which a family of stability boundary curves in the E sub z vs. B plane are found for the case of a helical perturbation in helium. The condition of energy balance of the column including the azimuthal electric field is combined with the dispersion relation to yield a family of stability boundary curves in the E sub theta vs. B plane with gas pressure times tube radius as a parameter. These curves indicate regions of stability which are absent in the case of a static magnetic field. (Author)

AD-412 813 Div. 25, 12
(TISTA/GEC) OTS price $10.50

General Electric Co., Schenectady, N. Y.
MAGNETIC BEARINGS FOR AEROSPACE APPLICATIONS.
Final rept., Mar 62-Feb. 63,
by R. F. Edgar, B. W. Merchant, L. Tonks, and J. D. McHugh. May 63, 133p.
Contract AF33 657 8240, Proj. 1315, Task 131502
ASD TDR63 474 Unclassified report

Descriptors: (*Aerospace craft, Bearings), (*Bearings, Magnetic fields), Magnetohydrodynamics, Feasibility studies, Servomechanisms, Magnets, Resonators, Electromagnets, Design, Power supplies, Stability, Cryogenics, Superconductors, Weight, Control systems.

A classification of magnetic bearing systems is presented; preliminary design configurations of selected different types are presented, analyzed and discussed. To cover a wide range of potential application, bearing systems capable of sustaining forces at 0.1, 10 and 1000 lb. force levels were studied. Cases were considered in which the load was undirectional (radial or axial) or combined,

In aerospace applications, total weight of the bearing system is extremely important. For the purpose of relative ranking of the different design configurations, therefore, estimates were made of the weight penalities for the fixed and supported members, associated power supply and control equipment. Based on this criterion, certain configurations appear superior; for example, bearing systems relying on permanent magnets in attraction to support 10 lb. axial force are estimated to weigh about thirty times less than a.c. electromagnets. Systems required to sustain both axial and radial loads of equal magnitude were studied. A permanent magnet arrangement combined with a servostabilized electromagnet has the lowest weight penalities for the three force levels considered when both are used in attraction. At the lowest force level (0.1 lb) for a freely suspended system, the a.c. resonant circuit configuration approaches the permanent magnet in low weight penalty.

AD-412 820 Div. 25, 8
(TISTE/CAM) OTS price $10.50

Controls for Radiation, Inc., Cambridge, Mass.
ANALYSIS OF PULSED X-RADIATION GENERATED BY HIGH POWERED ELECTRONIC EQUIPMENT.
Final rept.,
by James A. Wall. 18 June 63, 119p. Rept. no. CFR 102
Contract AF30 602 2493, Proj. 5561, Task 55212
RADC TDR63 29 Unclassified report

Descriptors: (*Electronic equipment, X-rays), (*X-rays, Spectrum analyzers), (*Spectrum analyzer, Scintillation counter), Radiofrequency power, Analysis, Theory, Klystrons, Instrumentation, Ionization chambers, Experimental data, Measurement, Electron beams, Photons, Copper, Particle accelerator targets, Geiger counters, Photographic film.

A scintillation spectrometer was tested for its ability to measure the spectra of pulsed x-radiation. It was found to be a useful instrument for the measurement of the spatial energy distribution of x-rays generated by high-powered electronic equipment. A theoretical study was conducted in an attempt to obtain a means of predicting the spatial energy distribution of x-rays generated by electrons with energies between 10 KV and 500 KV incident on a thick copper target. At least qualitative agreement was obtained between the theoretical and experimental results for x-rays generated by electrons with energies up to 74.7 KV. Different x-ray detectors were tested for their response to pulsed x-rays and R.F. radiation. G.M. counters were found useful only for the measurement of pulsed x-rays of low peak intensity, but were unaffected by R.F. radiation. (Author)

AD-412 834 Div. 25
(TISTM/EJH) OTS price $5.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
THE EFFECT OF SHEAR AND NORMAL FORCES ON THE FULLY PLASTIC MOMENT OF I-BEAMS,
by B. G. Neal. Oct 61, 56p. Technical rept. no. 12
Contract N189 40621A X
NNS 12 Unclassified report

Descriptors: (*Plasticity, Cantilever beams), (*Shear stresses, Cantilever beams), (*Cantilever beams, Plasticity), (*Stresses, Cantilever beams), Deformation, Loading (Mechanics), Failure mechanics, Mathematical analysis, Differential equations.

Lower bound solutions for the plastic collapse load of an end-loaded cantilever beam of I-section are developed and compared with existing upper bound solutions. The end shear load can only exceed the load corresponding to the yield stress in shear acting over the full web area for extremely short beams, and it is suggested that this load represents the practical limit of shear force. For longer beams a lower bound solution is given which agrees closely with an existing upper bound solution, and an empirical interaction relation between shear load and moment at the clamped end is put forward as a summary of the results. (Author)

AD-412 875 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Metcalf Research Lab., Brown U., Providence, R. I.
THE CRYSTAL STRUCTURE OF BORON TRIFLUORIDE DIHYDRATE,
by W. B. Bang and G. B. Carpenter. June 63, 6p. Technical rept. no. 11
Contract Nonr56204, Proj. NR017 607
Unclassified report

Descriptors: (*Boron compounds, Fluorides), (*Hydrates, Crystal structure), (*Crystal structure, Boron compounds), Hydrogen, Chemical bonds, Crystallization, Crystal lattices, Diffraction analysis.

Boron trifluoride dihydrate, prepared by introducing boron trifluoride gas into water and subsequent fractional crystallization, was sealed in Pyrex glass capillaries. Crystals were grown in the capillaries by cooling with a stream of cold nitrogen; crystallization was initiated by touching the capillary lightly with a piece of Dry Ice. The best crystal was used for all diffraction measurements; the b+c direction was along the capillary axis. The present structure determination was undertaken to ascertain the true nature of this substance and to study the hydrogen bonding pattern. (Author)

AD-412 893 Div. 25, 15
(TISTP/FEM) OTS price $1.60

Harry Diamond Labs., Washington, D. C.
OPERATOR-EQUIVALENTS,
by N. Karayianis and C. A. Morrison. 25 June 63, 12p.
Contract DA1A013001A039, HDI Proj. A0200
HDL TR1132 Unclassified report

Descriptors: (*Operators (Mathematics), Matrix algebra), (*Quantum mechanics, Tensor analysis), Momentum, Numerical analysis, Transformations (Mathematics), Polynomials, Tables.

The method of operator-equivalents that is used to evaluate matrix elements of the form $\langle JM' | T_{\ell m} | JM \rangle$ is discussed. Here, $T_{\ell m}$ is the mth component of an irreducible tensor operator of rank ℓ, and $|JM\rangle$ is a total angular momentum state. An operator $\Omega_{\ell m}$ is constructed from the spherical components of $\vec{J}$ so that it is patently a spherical tensor. The equivalence between $T_{\ell m}$ and $\Omega_{\ell m}$ is discussed, and the relationship of the latter to a Clebsch-Gordan coefficient is obtained. A method for generating the $\Omega_{\ell m}$ is developed. This method is used to obtain a general expression for $\Omega_{\ell m}$ for $\ell - 6 \leq m \leq \ell$ and ℓ arbitrary; the evaluations of these results, specifically for $1 \leq \ell < 6$, are tabulated. (Author)

AD-412 896 Div. 25
(TISTM/RGR) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
THE EVALUATION OF OVERLAP INTEGRALS BETWEEN ARBITRARILY ORIENTED ATOMIC ORBITALS,
by Emmett B. Moore, Jr. May 63, 11p. Document no. D1 82 0246
Unclassified report

Also available from the Author.

Descriptors: (*Atomic orbitals, Integrals), Molecular structure, Crystal structure.

Formulas are presented for overlap integrals between atomic orbitals which are arbitrarily oriented. Two cases are discussed: s and p orbitals located on centers at any specified positions with the p orbitals oriented in any direction in space, and s and p orbitals located on centers at any specified positions with the p orbitals oriented along the x, y, or z axes. Only s and p orbitals are discussed and it is assumed that the values of sigma and pi type overlap integrals are known from tables or computer programs. (Author)

AD-412 921 Div. 25, 8
(TISTP/FEM) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
LONG WAVELENGTH CHARGE OSCILLATIONS OF A CYLINDRICAL PLASMA.
by Richard Gerwin. June 63, 19p. Rept. DI82 0255
Unclassified report

Also available from the author.

Descriptors: (*Plasma physics, Magnetic fields), (*Plasma oscillations, Cylindrical bodies), (*Oscillation, Damping), Pertubation theory, Density, Equations, Propagation, Plasma medium, Electromagnetism, Cyclotrons, Electron beams, Frequency, Integral transforms, Numerical methods and procedures, Electron density, Integrals.

A cylindrical plasma is given to be in an infinitely strong axial magnetic field. Taking only longitudinal temperature into account, a dispersion relation (including Landau damping) is calculated for electron charge oscillations whose wavelengths are much larger than the plasma radius. The Landau damping is found to be far larger than that of waves in an infinite plasma of the same density and temperature, and for the same wavelength. The radiation damping of these oscillations is also calculated. It is found that these oscillations do not radiate at all from an infinitely long cylinder. For a plasma cylinder of finite length it is found that the radiation damping of these oscillations can be made negligible compared to Landau damping for reasonable laboratory parameters. It is assumed throughout that the unperturbed state is a Maxwellian velocity distribution. (Author)

AD-412 935 Div. 25
(TISTM/BRW) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
INTRODUCTION TO PHOTOELASTICITY,
by Y. F. Cheng. May 63, 25p. Document no. D1 82 0243
Unclassified report

Also available from the author.

Descriptors: (*Solids, Stresses), (*Photoelasticity, Analysis), Light transmission, Polarization, Wave transmission, Polariscopes.

AD-412 947 Div. 25
(TISTP/FEM) OTS price $1.10

Harry Diamond Labs., Washington, D. C.
OPERATOR-EQUIVALENTS FOR GROUND STATES OF EQUIVALENT ELECTRONS,
by C. A. Morrison and N. Karayianis. 28 June 63, 12p.
Proj. DA1A013001A039; HDL Proj. A0200
HDL TR 1133 Unclassified report

Descriptors: (*Quantum mechanics, Electric fields), (*Field theory, Atomic orbitals), Spin, Electrons, Momentum, Atomic energy levels, Crystal lattices, Crystal structure, Numerical methods and procedures, Operators (Mathematics), Matrix algebra, Tensor anslysis.

The expression for $c_\ell(Nk)$ in the equivalence $r^\ell Y_{\ell m} \approx \langle r^\ell \rangle_{nk} c_\ell(Nk) \omega_{\ell m}$ is obtained for ground states given by Hund's rule. Here $r^\ell Y_{\ell m}$ is a component of a perturbing electric field, and $\omega_{\ell m}$ is an operator-equivalent. The Hund ground state involves N equivalent electrons , each with k units of orbital angular momentum and principal quantum number n. (Author)

AD-412 948 Div. 25
(TISTP/WH) OTS price $11.00

Stanford U., Calif.
GEOCYCLOTRON FEASIBILITY STUDY.
Final rept.,
by T. F. Bell, R. A. Helliwell, R. F. Mlodnosky, and R. L. Smith. May 63, 146p. Rept. no. SEL63 007
Contract AF29 601 4506, Proj. 7811, Task 781103
AFSWC TDR63 35 Unclassified report

Descriptors: (*Cyclotron resonance phenomenon, Electromagnetic waves), (*Cyclotrons, Geophysics), Electrons, Motion, Very low frequency, Radio waves, Ionsophere, Feasibility study, Propagation, Terrestrial magnetism.

Results are presented of an investigation on the feasibility of the geocyclotron experiment proposed by Helliwell & Bell. (J. Geophys. Res., 65, 6 June 1960, pp. 1839-42). The present study confirms the original suggestion that energy from a suitable VLF wave can be coupled to (the) trapped electrons. It is found, however, that this coupling is restricted to certain conditions of the propagating wave. (Author)

AD-412 951 Div. 25
(TISTP/WH) OTS price $2.60

General Electric Co., Philadelphia, Pa.
EXPERIMENTS WITH THE OPTICAL EXCITATION OF MERCURY VAPOR FOR THE PRODUCTION OF ISOLATED FLUORESCENCE,
by R. Zito, Jr. and A. E. Schraeder. 16 Aug 63, 22p. Rept. no. R63SD301
Unclassified report

Descriptors: (*Electroluminescence, Excitation), (*Mercury, Vapors), Display systems, Phosphorus, Sulfur, Nitrogen, Atoms, Photons, Inelastic scattering, Electron transitions.

Empirical data are presented for the preliminary intensity and resolution measurements made in the multiple-step induced fluorescence of mercury

vapor. The primary contemplated application for such a process is the production of an isolated source of visible radiation in three-dimensional space. A dual optical excitation process is employed in conjunction with inelastic foreign gas molecule collision for the resultant spontaneous, visible fluorescence of excited mercury atoms. Details of the experimental apparatus and techniques employed are also given. (Author)

AD-412 953 Div. 25
(TISTP/WH) OTS price $3.60

Aerospace Information Div., Washington, D. C.
LATTICE DYNAMICS ANNOTATED BIBLIOGRAPHY OF SOVIET LITERATURE.
2 Aug 63, 34p.
AID Rept. B63 101 Unclassified report

Descriptors: (*Bibliographies, Crystal lattices), Compressive properties, Temperature, High-pressure research, Energy, Thermal conductivity, Spectra (Infrared), Molecules, Vibration.

Contents:
Characteristic temperatures
High pressures and compressibilities
Lattice energies
Heat capacities
Infrared lattice vibrational spectra
Thermal conductivity

AD-412 955 Div. 25, 30
(TISTP/JH) OTS price $8.10

Birmingham U., Gt. Brit., Medical School.
PROPERTIES AND REACTIVITY OF GAS PHASE FREE RADICALS AND DEVELOPMENT OF MOLECULAR BEAM REACTOR.
Final technical rept., 1 Feb 62-31 Jan 63, 1963, 58p.
Contract DA91 591euc2149
Unclassified report

Descriptors: (*Kinetic theory, Molecular beams), (*Molecular beams, Kinetic theory), (*Free radicals, Molecular beams), Laboratory equipment, Ion beams, Mass spectroscopy, Argon.

The work reported is concerned with development and applications of a technique for the study of the primary products of reactive bi-molecular collisions. The method is based on passing a high intensity molecular beam of one reactant through a vessel containing the second reactant at very low pressure, and detecting the collision products by mass-spectrometer techniques. Four methods previously used for producing accelerated beams of neutral molecules, are reviewed. It is concluded that neutralization of an ion beam is the best method for present purposes, as it is capable of giving a continuous supply of molecules with sufficiently great translational energy. (Author)

AD-412 958 Div. 25
(TISTM/RGR) OTS price $1.60

International Research and Development Co., Ltd. (Gt. Brit.).
THE VISCOSITY OF HELIUM-CESIUM MIXTURES,
by I. R. McNab. July 63, 5p. Rept. no. IRD 63 59
Contract N62558 3127, Proj. 549
Unclassified report

Descriptors: (*Helium, Mixtures), (*Cesium, Gases), Viscosity, High-temperature research, Theory.

The viscosities of helium-cesium mixtures having mole fractions of cesium from zero to unity were evaluated using a Lennard-Jones 6-12 interaction potential for all encounters in the Enskog-Chapman expressions for the viscosity of a binary mixture. (Author)

AD-412 966 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROPAGATION OF ELASTIC-PLASTIC LOAD WAVE IN A ROD OF FINITE LENGTH,
by A. I. Buravtsev. 19 June 63, 10p.
FTD TT63 506 Unclassified report

Descriptors: (*Mechanical waves, Propagation), (*Rods, Mechanical waves), Elasticity, Plasticity, Partial differential equations, Equations.

AD-412 971 Div. 25
(TISTP/FEM) OTS price $9.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
VIBRATIONS OF THIN SHELLS: A PARTIALLY ANNOTATED BIBLIOGRAPHY,
Comp. by Charles G. Gros and Kevin Forsberg.
Apr 63, 97p. Special bibliography SB63 43; 3 71 63 2
Contract AF04 695 59
Unclassified report

Descriptors: (*Bibliographies, Vibration), (*Vibration, Structural shells), Elastic shells, Spheres, Conical bodies, Geometric forms, Cylindrical bodies, Flutter, Thickness, Fluids.

The vibration of thin shells is the subject of this bibliography. With the exception of the work on flutter, an attempt is made to provide as complete coverage as possible. Since much of the work on the flutter of cylindrical shells is concerned more with aerodynamics and fluid flow than with shell dynamics as such, only flutter material of general interest from the structural point of view has been cited. The 215 citations given cover the period from 1957 through March 1963; the two bibliographies by W. A. Nash, to which reference is made, cover the period from 1880 through 1956. There is, in addition to the ten major subject categories into which most of the citations fall, a Secondary Subject Index indicating nine other subjects. Personal and Corporate Author Indexes are included. The resources of the Technical Information Center, Lockheed Missiles & Space Company, were utilized. Search completed April 1963. (Author)

AD-413 000 Div. 25
(TISTP/WH) OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
NORMAL MODE VIBRATIONS OF SYSTEMS OF ELASTICALLY CONNECTED PARALLEL BEAMS,
by J. M. Seelig and W. H. Hoppmann, II. July 63, 26p.
Contract DA30 069AMC195
Unclassified report

Descriptors: (*Beams (Structural), Elasticity), (*Elasticity, Beams (Structural), Partial differential equations, Motion, Vibration, Simultaneous equations, Stresses.

The development and solution are presented of the differential equations of motion of a system of n-elastically connected parallel beams. Using the results developed for the general n-beam system, the particular case of a two beam system was analyzed in detail. The frequencies and associated mode shapes for various support conditions are presented explicitly. Vibration experiments were performed in order to ascertain the degree of applicability of the theory. It was found that at least up to the eighth mode, reasonably good agreement obtains. (Author)

AD-413 003 Div. 25
(TISTP/WH) OTS price $1.60

Basle U. (Switzerland).
ANALYSIS OF THE SPECTRUM OF THE NITRIC OXIDE MOLECULE,
by E. Miescher. May 63, 6p.
Grant AF EOARDC61 19
AFCRL 63 822 Unclassified report

Descriptors: (*Molecular spectroscopy, Band spectrum), (*Nitrogen compounds, Oxides), Free radicals, Isotopes, Spectra (Infrared), Molecules, Spectra (Visible and ultraviolet), Emissivity, Absorption spectrum, Molecular rotation.

A survey is given of the excited states of the NO molecule, Rydberg (R) states as well as Non-Rydberg (NR) states, and the present knowledge of the interactions between R- and NR- states is outlined. These include the homogeneous $\Delta - \Delta$ perturbation occuring between levels of the $F\ ^2\Delta$ R-state and the $B'\ ^2\Delta$ NR-state. Correlated emission bands of the molecule are reviewed. The absorption spectrum of NO18 was photographed with very high dispersion between 1600 and 1350 Angstroms. Spectra of three isotopic NO molecules are now available. The implications on the future work are discussed. (Author)

AD-413 011 Div. 25, 4
(TISTM/TCG) OTS price $2.60

Emmanuel Coll., Research Language Center, Boston, Mass.
THE PHASE COMPOSITION, LUMINESCENT PROPERTIES, AND STRUCTURE OF SYNTHETIC ZINC SILICATES CONTAINING MANGANESE (Fazovyi sostav, liuminestseptnye svoistva i struktura sinteticheskikh silikatov tsinka, soderzhashchikh marganets),
by V. V. Osiko, tr. by Richard M. Holden.
May 63, 23p. Research trans. no. E T R63 11
Contract AF19 604 8505
Unclassified report

Trans. from Zhurnal Neorganicheskoi Khimii, 5:2, pp. 297-305, 1960.

Descriptors: (*Zinc compounds, Phase studies), (*Silicates, Luminescence), (*Phase studies, Silicates), Additives, Manganese, Crystal structure, X-ray photography, Crystallization, Thermionic emission, Diffusion, Crystal lattices.

The purpose of this work is to make a parrallel study of the relationship between the luminescent properties and phase composition of zinc silicates containing manganese and the chemical composition of the system and its synthesis conditions. (Author)

AD-413 026 Div. 25
(TISTP/WH) OTS price $12.50

Massachusetts Inst. of Technology, Cambridge.
ENGINEERING BEHAVIOR OF PARTIALLY SATURATED SOILS.
Phase rept. no. 1.
May 63, 1v. Research rept. R63 26; Publication no. 134
Contract DA22 079eng288, DA Proj. 1T0 21701A046 05
Unclassified report

Descriptors: (*Soil mechanics, Shear stresses), (*Soils, Moisture), Compressive properties, Volume, Civil engineering, Equations, Tables.

The shear strength and volume change behavior of a partially saturated cohesive soil is assessed as a function of the degree of saturation. All samples consisted of an 80 percent ground quartz - 20 percent kaolinite mixture compacted dry of optimum water content. Special shear and compression equipment were developed to enable measurements of total volume, water content, total stress, pore air pressure and pore water pressure simultaneously. The test data showed that the effective stress equation $s = s - u_a + x(u_a - u_w)$ wherein x should vary between 0 and 1.0 for degrees of saturation between 0 and 100 percent was inconsistent on two counts: (1) The shear tests at maximum stress difference yielded x values greater than unity (1.01 to 1.36) for degrees of saturation between 65 and 73 percent; (2) Compression samples under a constant applied pressure of 6 kg/square cm reduced in volume, i.e. 'collapsed', when the capillary pressure and hence effective stress was decreased, thus yielding negative values of x. (Author)

AD-413 030 Div. 25
(TISTM/EJH) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE CRYSTAL STRUCTURE OF 1,3-DICHLORO-2,4,6-TRINITROBENZENE,
by James R. Holden. Aug 63, 19p.
NOLTR 62 158 Unclassified report

Descriptors: (*Organic compounds, Crystal structure), (*Crystal structure, Organic compounds), Organic nitrogen compounds, X-ray diffraction analysis, Stereochemistry, Tables, Aromatic compounds.

1,3-Dichloro-2,4,6-trinitrobenzene crystallizes in the orthorhombic system, space group pbcn, with four molecules in a unit cell of dimensions: a = 5.93, b = 14.98, c = 10.91 A. Atomic positions within the unit cell were determined by interpretation of three-dimensional Patterson calculations followed by refinement by Fourier and least-squares procedures. Each molecule lies on a two-fold axis and contains a benzene ring which is planar but slightly distorted in the direction required to relieve the steric strain of adjacent chlorine and nitro groups. The nitro group in the ''2'' position is rotated 76 degrees out of the plane of the benzene ring, but the symmetrically related nitro groups in the ''4'' and ''6'' positions are rotated only 37 degrees. (Author)

AD-413 050 Div. 25
(TISTP/WH) OTS price $8.60

Philips Labs., Inc., Irvington-on-Hudson, N. Y.
STUDY AND MATERIAL DEVELOPMENT OF MAGNETOSTRICTIVE FERRITE ELEMENT.
Final rept.,
by F. G. Brockman, P. W. Beck, and W. G. Steneck.
12 July 63, 83p. Technical rept. no. 163
Contract NOw63 0223
Unclassified report

Descriptors: (*Ferrites, Magnetostriction), (*Transducers, Magnetostriction), (*Magnetostriction, Transducers), Iron compounds, Tetroxides, Manganese alloys, Cobalt alloys.

A study has been made of the ferrite system Mn(x)Fe(1-x)Fe2O4 as materials for magnetostrictive transducer applications. A region of compositions in this system exhibits coupling coefficients in excess of 30% with a maximum value exceeding 50%. A beginning was made in the reduction of the electrical conductivity of the composition possessing this maximum in the coupling coefficient. A detailed electromechanical analysis of this latter material is reported. Similar detailed studies are given for Co0.01-Fe0.99Fe2O4 and for FeFe2O4. In certain of the more (electrical) conducting materials eddy current effects are observed. (Author)

AD-413 052 Div. 25
(TISTP/JP) OTS price $9.60

Vitro Labs., Silver Spring, Md.
PRECISION ULTRASONIC MEASUREMENTS FOR MICROBUBBLE RESEARCH,
by W. R. Turner. 26 July 63, 102p. Technical note 01654 01 1
Contract Nonr3159 00
Unclassified report

Descriptors: (*Ultrasonic radiation, Measurement), (*Bubbles, Detection), (*Underwater sound, Detonation), Sound transmission, Velocity, Water, Interferometers.

New techniques are described for the measurement of ultrasonic attenuation and velocity in water at three frequencies in the 1-10 megacycle range The basic instrument configuration is that of a Mach-Zehnder type interferometer, with one path including the ultrasonic cell and the others, a precision attenuator. The cell consists of three frequency transducer, a supporting cage, and a reflector, with a folded, one meter path length. In operation, the signal source is switched for a short pulse interval to the ultrasonic cell, and then returned to the attenuator path. This pulse, delayed by transit through the cell, is mixed with the attenuator signal to obtain a null and displayed on an oscilloscope. Ultrasonic attenuation is determined from the attenuator setting, and ultrasonic velocity from the frequency interval between nulls. Standar deviation of relative attenuation measurements is 0.12 db, and of relative velocity measurements, three parts in 100,000. The certainty of individual relative velocity measurements, however, is one part in 10,000. (Author)

AD-413 068 Div. 25
(TISTM/RGR) OTS price $4.60

RAND Corp., Santa Monica, Calif.
ENERGY LEVELS, PARTITION FUNCTIONS AND FRACTIONAL ELECTRONIC POPULATIONS FOR NITROGEN AND OXYGEN ATOMS AND IONS TO 25,000 DEGREES K,
by F. R. Gilmore, Aug 63, 40p. Rept. no. RM3748PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Atomic energy levels, Electrons), Theory, Statistic mechanics, Nitrogen, Oxygen, Ions, High-temperature research, Tables.

Energy levels for N, N(+), N(2+), N(3+), O, O(+), O(2+), and O(3+) are tabulated for all possible electronic states or groups of states having two electrons in the n = 1 shell, one electron in the n = 2 to 8 shell, and the remaining electrons in the n = 2 shell. Where experimental values were not availale, theoretical estimates were made. The corresponding partition functions and fractional populations for each electronic state of these species were calculated on an IBM 7090 and are reported for 34 temperatures between 1000 and 25,000 K. Alternate partition functions including only electronic states out to n = 4 are also tabulated. (Author)

AD-413 073 Div. 25, 8
(TISTP/FEM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR THE OBTAINMENT OF STATIC MAGNETIC CHARACTERISTICS OF FERROMAGNETIC MATERIALS,
by V. A. Kadkii. 21 June 63, 5p.
FTD TT63 435 Unclassified report

Trans. from Patent No. 147672, (Appl. No. 697260/24, pp. 1-3, 11 Feb 61.

Descriptors: (*Ferromagnetic materials, Measurement), (*Electronic equipment, Magnetic properties), Focusing, Oscilloscopes, Mechanical drawing, Alternating current, Circuits, Coils, Solenoids, Amplifiers, Transformers, Static electricity, Cathode ray tubes.

A device is described for the obtainment of static magnetic characteristics of ferromagnetic materials with the aid of a cathode oscillograph, containing: magnetized solenoid-coil, in which is included the investigated item, including a sample of the measuring coil, brought into reciprocal motion, for the creation in it of an alternating voltage circuit and two amplifiers-transformers, to the input of one of which is fed an alternating voltage of measuring coil, and to the input of the second - voltage drop per resistance, included in the circuit of the magnetization current. (Author)

AD-413 104 Div. 25, 30
(TISTM/EJH) OTS price $8.10

Valley Forge Space Technology Center, Philadelphia, Pa.
STRUCTURAL RESPONSE TO INTENSE ELECTROMAGNETIC RADIATION.
Annual technical rept. no. 2, 1 Mar 62-28 Feb 63, by Robert C. Good, Jr. 28 Feb 63, 80p.
Contract AF49 638 1030, Proj. 9782, Task 37718
Unclassified report

Descriptors: (*Energy conversion, Electromagnetic waves), (*Exploding wires, Energy conversion), (*Electromagnetic waves, Energy conversion), (*Glass, Electromagnetic waves), (*Radiation damage, Electromagnetic waves), Plastics, Plasma physics, Stresses, Thermal stresses, Instrumentation, Resistance (Electrical), Electric discharges, Thermocouples, Mathematical analysis.

An exploding wire apparatus was used to study conversion of electrical energy into strain energy in glass samples that were either irradiated by the electromagnetic waves emitted by the wire or enveloped by plasma formed by the wire. The strain energy left permanent marks on the sample as discoloration, weight loss, and surface cracks. These were used to confirm the theoretical analysis as to method and to dimensions. Conversion of energy within the sample was postulated to involve thermal absorption, diffusion, and strain. The thermal diffusion equation was solved and values computed for the heating and cooling por-

tions of the pulse. By linking the quantity of material heated with experimental measurements, an overall absorption coefficient for glass of 10 to the 3rd power per cm and an energy deposition of 1/2 joule/sq cm was found. The large absorption coefficient indicates that most of this energy radiated by the wire must be in the ultraviolet portion of the spectrum. (Author)

AD-413 111 Div. 25
(TISTP/WH) OTS price $8.10

North Carolina State Coll., School of Physical Sciences and Applied Mathematics, Raleigh.
THE EFFECT OF INTERNAL CRACKS ON THE DISTRIBUTION OF STRESS IN THIN ELASTIC STRIPS AND CYLINDERS,
by Ian N. Sneddon. 28 July 63, 77p.
Grant AF AFOSR444 63
Unclassified report

Lectures given in the Department of Mathematics, North Carolina State College, Apr 1963, Raleigh, North Carolina.

Descriptors: (*Fracture (Mechanics), Stresses), (*Stresses, Fracture (Mechanics)), Elasticity, Load distribution, Cylindrical bodies, Numerical methods and procedures, Integral equations, Boundary value problems.

AD-413 112 Div. 25, 15
(TISTP/MFA) OTS price $1.60

North Carolina State Coll., School of Physical Sciences and Applied Mathematics, Raleigh.
A TWO DIMENSIONAL CRACK PROBLEM,
by Morton Lowengrub. 1 June 63, 18p.
Contract AF49 638 1159
Unclassified report

Descriptors: (*Fracture (Mechanics), Analysis), (*Stresses, Distribution theory), Fourier analysis, Elasticity, Boundary vavle problem, Integral equations, Partial differential equations, Integral transforms.

The problem of determining the distribution of stress in the neighborhood of a crack in an infinitely long elastic strip is considered. In recent theories of fracture, the determination of stress in the neighborhood of a crack in an elastic body plays an important role. The theory of cracks in a two dimensional elastic medium was first developed by Griffin who succeeded in solving the equations of elastic equilibrium for a space bounded by two concentric coaxial ellipses. The problems discussed in this paper are the two dimensional analogues of the three dimensional problems considered by the author. Problems of this type have also been considered by Collins. He uses a representation of the displacement vector as given in Green and Zerna to solve the equations of elastic equilibrium. It is assumed that the equations of the classical (infinitesimal) theory of elasticity hold. (Author)

AD-413 113 Div. 25
(TISTP/MFA) OTS price $4.60

Coordinated Science Lab., U. of Illinois, Urbana.
CRYSTALLIZATION OF THE SUPERCONDUCTOR Nb3Sn,
by Wing C. Leung. May 63, 35p. R170
Contract DA36 039AMC02208, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Intermetallic compounds, Crystal growth), (*Niobium, Tin), (*Crystallization, Superconductors), Measurement, Single crystals, X-ray diffraction analysis, Crystal structure, Symmetry (Crystallography), Nucleation, Melting, Phase studies.

Studies and experiments on the crystallization of Nb3Sn have been done on the basis of the following information: Nb3Sn is stable at 900 C and above; appreciable amounts of Nb can be dissolved in Sn at 1200 C; nucleation and growth are the result of the continuous supersaturation at a particular location in a saturated solution. Experimental results clearly indicate that crystallization of Nb3Sn will occur from a saturated solution of niobium in tin; however, due to excessive nucleation only polycrystalline clusters of Nb3Sn crystals were achieved. More detailed studies and experimental investigation are required to obtain the optimum conditions for single crystal growth. (Author)

AD-413 122 Div. 25
(TISTP/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON A NEW POSSIBLE MECHANISM OF RECOMBINATION IN SEMICONDUCTORS,
by M. K. Sheynkman. 19 June 63, 5p.
FTD TT63 507 Unclassified report

Trans. from Ukrains'kiy Fizichniy Zhurnal, 7:12, pp. 1364-1365, 1962.

Descriptors: (*Semiconductors, Recombination reactions), (*Recombination reactions, Semiconductors), Theory, Energy, Transport properties.

This report introduces a new mechanism of recombination in semiconductors and shows that the difficulty lies in the transmission of energy of the element in the act of trapping the nonbasic carrier and how this can be overcome. (Author)

AD-413 126 Div. 25, 9
(TISTP/JEA) OTS price $9.60

Stanford U., Calif.
HEAT TRANSFER IN WAKES,
by D. B. Adarkar and W. M. Kays. 1 Apr 63, 192p.
Technical rept. no. 55
Contract Nonr22523, Proj. NR090 342
Unclassified report

Descriptors: (*Heat transfer, Wake), (*Wake, Laminar flow), Laminar boundary layers, Equations, Thickness, Vortices, Numerical methods and procedures, Turbulence, Intensity, Heat transfer coefficients, Metal plates, Velocity, Temperature.

This work concerns the heat transfer from and drag on a flat plate when it is placed in the wake of an identical flat plate. Each plate is at a constant but not necessarily equal temperature. The analytical development considers the case of two collinear zero thickness plates aligned with a steady, incompressible, laminar flow, and assumes that the boundary layer equations apply throughout. The experimental work includes heat transfer measurements, temperature and velocity (hot wire) probing of the wake behind the first plate, vortex shedding frequency measurements, and flow visualization in a water table. Three pairs of plates of varying thickness are used. The ''thin'' pair is sharpened at leading and trailing edges while

the thicker pairs are rectangular in cross-section. Of the results of this study, those of main interest to the heat exchanger designer are: that the second plate models fairly well the ''average fin'' of a strip-fin heat exchanger surface; that (based on the criterion of desirability of least pumping power per unit heat transfer rate) there is an optimum in fin thickness; and that care must be used in interpreting heat transfer data in the range of possibly stable vortex shedding. (Author)

AD-413 130 Div. 25, 8
(TISTE/AAR) OTS price $9.60

Hewlett-Packard Co., Palo Alto, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 3, 1 Mar-31 May 63.
31 May 63, 108p.
Contract AF33 657 9772
Unclassified report

Descriptors: (*Transistors, Electrical properties), (*Diodes, Electroluminescence), (*Spectrophotometers, Scientific research), Lasers, Couplings, Crystal growth, Crystals, Synthesis, Zinc, Sulfur.

AD-413 135 Div. 25
(TISTP/FEM) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
AN INSTRUMENT FOR THE MEASUREMENT OF SPECIFIC VOLUME IN LIQUIDS,
by Wayne Wilson. 31 May 63, 12p.
NOL TR63 131 Unclassified report

Descriptors: (*Instrumentation, Liquids), (*Liquids, Thermodynamics), (*Densimeters, Design), Measurement, Volume, Density, Velocity, Sound, Transformers, Coils, Quartz, Viscosity, Silicon compounds.

An instrument was designed to measure the specific volume of liquids for pressures between 14.7 and 14,000 lb/square inch, and for temperatures between 0 degrees C and 100 degrees C. The instrument is based upon the ability of a differential transformer to detect changes in length with high precision. A description of the instrument, its present calibration, and the results obtained in a Dow Corning solution (DC 200) are given. (Author)

AD-413 272 Div. 25
(TISTP/JP) OTS price $10.50

Stevens Inst. of Tech., Hoboken, N. J.
LONGITUDINAL INSTABILITIES OF RELATIVISTIC BEAMS IN AXIALLY SYMMETRIC MAGNETIC FIELDS,
by R. W. Landau. 1963, 131p. Rept. no. P98 5 63
Contract DA36 039sc87242, ARPA Order 112 61
Proj. 7600
Unclassified report

Descriptors: (*Particle beams, Oscillation), Quantum mechanics, Relativity theory, Magnetic fields, Particle accelerators, Betatrons, Synchrotrons, Space charges, Beams (Electromagnetic), Plasma medium, Electrons, Focusing.

A canonical formalism has been developed for the description of the negative mass instability (N. M. I.) and longitudinal oscillations of relativistic beams. This formalism has been applied to ascertain the stabilizing effect of betatron oscillations, and to determine the dispersion relation governing counterstreaming ions and relativistic electrons. The results show that only the spread in p, the canonical angular momentum of the particles, contributes to stability. The N.M.I. equations for two streams is the same as though were separately present; and the dispersion relation for longitudinal oscillations of beams in a magnetic field is given by the N.M.I. dispersion relation, and not by the dispersion relation for longitudinal oscillations of collinear beams. Moreover, the dispersion relation for longitudinal oscillations of thin collinear beams differs from the usual equation by a non-trivial factor. (Author)

AD-413 307 Div. 25
(TISTP/FEM) OTS price $2.60

Oregon U., Eugene.
ARE BLOCH BANDS AT FINITE ELECTRIC FIELD ADIABATICALLY CONNECTED TO THOSE AT ZERO FIELD,
by G. H. Wannier and J. P. VanDyke. 1963, 20p.
Technical rept. no. 2
Contract NONR277105, Proj. NR017 633
Unclassified report

Descriptors: (*Electric fields, Particles), (*Electrical potential, Theory), Electromagnetic fields, Models (Simulations), Operators (Mathematics), Partial differential equations, Integral equations, Phase shifters, Magnetic fields.

If a potential consists of a superposition of a periodic part and a uniform electric field than for a particle moving in this field there are Bloch bands closed in time. The present report addresses itself to the question whether these bands may be identified with the field-free bands. The most natural thing is to expect that the bands are slightly field dependent, but converge toward the field-free bands as E goes to zero. Bands for which this is true are said to be adiabatically connected to corresponding bands at zero field. Two model cases are given for which this adiabatic connection pertains. It is shown that the answer to the question in the report title is almost always negative. In this proof the positive cases serve an essential function. It is shown that the parameters of the periodic potential must obey at least one supplementary condition to allow adiabatic connection, and that the collected cases precisely obey this condition. Adiabatic connection is thus generally not possible. An explicitly soluble case is presented which does not allow adiabatic connection. (Author)

AD-413 309 Div. 25
(TISTM/REB) OTS price $1.10

Ecole Normale Superieure (France).
EFFECTS OF PROTON IRRADIATION ON THE PROPERTIES OF SILICON,
by A. Authier, P. Lallemand, and J. C. Pfister.
25 Apr 63, 8p. Technical note no. 1
Contract AF61 052 543
AFCRL 63 312 Unclassified report

Descriptors: (*Silicon, Radiation damage), Crystals, Crystal lattice defects, Diffusion, Protons, X-ray diffraction analysis, Temperature, Thickness.

Diffusion enhancement, revealed by the displacement of a p-n junction, in silicon crystals proton-irradiated at high temperature has been studied previously. In the present work Lang's method has been used to study the defects created by irradiation. It has been found that the whole

thickness of the crystal may be perturbed and that this perturbation disappears if the region 10 microns from the surface (penetration depth of the protons) where the defects were created is etched away. (Author)

AD-413 313 Div. 25
(TISTM/EJH) OTS price $2.60

Kansas City U., Mo.
Cr51 NUCLEAR ORIENTATION IN A CERIUM MAGNESIUM NITRATE CRYSTAL,
by H. F. Taylor, Jr. and R. C. Sapp. 1 Aug 63, 18p. Technical rept. no. 5
Contract Nonr277500, Proj. NR018 202
Unclassified report

Descriptors: (*Chromium, Impurities), (*Radioactive isotopes, Chromium), (*Single crystals, Impurities), (*Cerium compounds, Impurities), (*Impurities, Rare earth compounds), Anisotropy, Cryogenics, Gamma rays, Polarization, Paramagnetic resonance, Nitrates, Magnesium compounds, Magnetic field.

Cr-51 nuclei were aligned in Cr(3+) ions introduced into a slightly cloudy, spherical single crystal of cerium magnesium nitrate and magnetically cooled to temperatures near absolute zero. Angular distribution and linear polarization data are interpretable on the basis of paramagnetic resonance information, if in addition the presence of intermediate state reorientation is accounted for by coefficients in the Legendre polynomial expansion of the radiation pattern $(\theta) = 1 + A_2 P_2 + A_4 P_4$. Results are contrasted with those of an earlier experiment, and compared with a theoretical treatment of reorientation by static, isotropic hfs coupling which yields in the hard-core limit at this temperature $Q_2 = 0.61$. (Author)

AD-413 327 Div. 25, 8
(TISTP/FEM) OTS price $2.60

Florence U. (Italy).
FUNDAMENTAL RESEARCH ON ELECTROMAGNETIC THEORY AND MICROWAVE SPECTROSCOPY,
by R. Pratesi, L. Ronchi, A. M. Scheggi, and G. Toraldo di Francia. Mar 63, 18p.
Grant AF EOAR62 103
AFCRL Rept. no. 63 169 Unclassified report

Descriptors: (*Microwave spectroscopy, Charged particles), (*Electromagnetism, Theory), Radiators, Electromagnetic waves, Electromagnetic fields, Electron transitions, Electron beams, Refractive index, Dielectrics, Metal films, Sheets, Electrical conductance.

Contents: (1) Radiation from a charged particle in uniform straight motion through a stratified medium periodically loaded with conducting films, (2) Radiation from a charged particle in uniform straight motion through a periodic succession of dielectric slabs, (3) Radiation from a charged particle passing through a circular opening in a conducting screen, (4) Radiation from a charged particle at oblique incidence on a plane conducting film separating two dielectric media.

AD-413 340 Div. 25
(TISTP/WA) OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
SCATTERING BY A PERFECTLY CONDUCTING CYLINDER IN A COMPRESSIBLE PLASMA,
by S. R. Seshadri, I. L. Morris, and R. J. Mailloux. 15 Apr 63, 17p. Technical rept. no. 409
Contract Nonr186632, Proj. NR 371 016
Unclassified report

Descriptors: (*Plasma physics, Compressive properties), Scattering, Particles, Electron density, Partial differential equations, Electromagnetic waves, Cylindrical bodies, Plasma sheath, Geometry, Series, Vector analysis, Compressible flow.

The scattering of a plane electromagnetic (EM) or plasma (P) wave by a perfectly conducting and rigid circular cylinder immersed in an isotropic, compressible plasma is treated. Expressions for all the physical quantities of interest are obtained in the form of infinite series. For the case of a plane EM wave incidence, numerical results for the current induced on the surface of the cylinder, the total scattering cross sections and the back-scattering cross section, are obtained as a function of ka for various values of the plasma frequency, where a is the radius of the cylinder and k is the wave number of the EM wave in free space. (Author)

AD-413 342 Div. 25
(TISTP/JP) OTS price $2.60

Florence U. (Italy).
RADIATION FROM A CHARGED PARTICLE PASSING THROUGH A CIRCULAR OPENING IN A PERFECTLY CONDUCTING SCREEN,
by L. Ronchi. Mar 63, 21p. Technical note no. 3
Grant AF EOAR62 103
AFCRL 63 166 Unclassified report

Descriptors: (*Charged particles, Photons), Grilles, Electrical conductance, Energy, Electromagnetic waves, Electron beams, Scattering, Series, Electromagnetic fields, Quantum mechanics.

The radiation arising in the passage of a charged particle in uniform straight motion through a circular opening in an ideally conducting plane screen, normal to the particle path, is investigated. The exact solution of the problem is found, in terms of spheroidal functions. (Author)

AD-413 346 Div. 25
(TISTP/WH) OTS price $2.60

California U., Los Angeles.
ATTENUATION OF REPEATED SPHERICAL SHOCK WAVES,
by Youngsun Shin. July 63, 25p. Technical rept. no. 22
Contract N6onr23348, Proj. NR014 302
Unclassified report

Descriptors: (*Shock waves, Sound), (*Attenuation, Shock waves), (*Sound, Harmonic oscillators), Anechoic chambers, Sound transmission, Waveform generators.

When finite amplitude sinusoidal waves travel in the air, stable shock waves are produced. These shock fronts of abrupt pressure change are caused by the non-linearity of the medium. The object of this experiment is to determine the excess attenuation of weak shock waves over the inverse square law and to compare the results with theory. The sound source was a siren and fundamental frequencies between 8.5 kc and 11 kc were used. The experiment was performed in an anechoic chamber. By correcting for an effective source position, the experimental results were brought into good agreement with the theory. (Author)

AD-413 356 Div. 25, 17
(TISTM/AMS) OTS price $1.60

Hughes Aircraft Co., Culver City, Calif.
SILICON: MEAN FREE PATH, DATA SHEETS.

by M. Neuberger. Jan 63, 8p. DS 120
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Silicon, Semiconductors), (*Semiconductors, Silicon), Scattering, Diffusion, Photons, Temperature, Boron, Single crystals, Impurities, Arsenic, Data.

The Electronic Properties Information Center has been established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluated and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Silicon: Mean Free Path. (Author)

AD-413 364 Div. 25
(TISTP/MFA) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
ON THE FEASIBILITY OF AN ETTINGSHAUSEN SEMICONDUCTOR LASER,
by H. Mette, E. Schiel and C. Loscoe. June 63, 10p.
AELRDL TR2374 Unclassified report

Descriptors: (*Lasers, Semiconductors), (*Diodes (Semiconductors), Injection), Feasibility studies, Deflection, Hall effect, Measurement, Magnetic fields, Excitation, Diffraction, Theory, Thermal conductivity, Diffusion.

The possibility of achieving stimulated recombination radiation in a semiconductor by an alternate method to the injection diode is investigated. The results show that an excess concentration of recombination carriers sufficient to initiate laser action may be obtained in semiconductors by drift and deflection in a magnetic field (Ettingshausen effect). However, further data are required to calculate the exact size of the threshold value. Although the current densities required for operating the device appear of similar order as for injection diodes, the pumping method is based entirely on bulk effects. Therefore, the device offers a number of practical advantages over junction devices, such as a larger emitting area and fast response time. The design of a possible Ettingshausen laser is discussed in detail and problem areas for future work are listed. (Author)

AD-413 382 Div. 25
(TISTP/WH) OTS price $1.60

Israel Inst. of Tech., Haifa.
MAGNETO-IONIC MODE PROPAGATION IN THE IONOSPHERE: THE DIRECTION OF MINIMUM ABSORPTION OF A HOMOGENEOUS PLANE WAVE TRAVERSING A HOMOGENEOUS IONOSPHERIC SLAB,
by C. Altman and H. Cory. 28 Feb 63, 12p. Technical rept. no. 3
Contract no. AF61 052 555
AFCRL 63 650 Unclassified report

Descriptors: (*Radio waves, Absorption (Physical)), (*Ionospheric propagation, Very low frequency), Plasma physics, Gas ionization, Electromagnetic fields, Propagation, Integral equations.

The absorption of homogeneous plane radio waves propagating through an idealized homogeneous ionospheric region in the magneto-ionic mode in various directions in the magnetic meridian plane is examined. Minimum absorption between two fixed heights is generally obtained when the wave normal is in a direction lying between the vertical and the direction of the geomagnetic field, but the percentage variation in total absorption between these two limits is small, and one may use either the condition of vertical incidence or the condition of ''field aligned propagation'' as an approximation to the condition of minimum absorption. For waves incident on a physical ionosphere from below this treatment is invalid, and the problem must be solved by making use of the Booker quartic equation. (Author)

AD-413 395 Div. 25
(TISTP/FEM) OTS price $1.10

Boston U., Mass.
(No title).
Final technical rept., 1 Feb 62-30 June 63. 30 June 63, 3p.
Grant AF AFOSR62 248
AFOSR 4997 Unclassified report

Descriptors: (*Phase studies, Spectrum analyzers), (*Quantum mechanics, Integral transforms), Scattering, Theory, Electromagnetic properties, Optimal images, Statistical processes, Electrical networks, Circuits, Automatic, Control systems, Particle spectra, Spin, Resonance, Bosons, Muons, Electrons.

AD-413 396 Div. 25, 20
(TISTP/FEM) OTS price $1.60

Columbia U., New York.
RESEARCH IN ELECTRON SPIN RESONANCE.
Final rept.,
by George K. Fraenkel. July 63, 15p.
Contract AF49 638 520
AFOSR 5127 Unclassified report

Descriptors: (*Spin, Resonance), (*Electrons, Spin), Free radicals, Hyperfine structure, Deuterium, Line spectrum, Microwave spectroscopy, Theory, Magnetic properties, Relaxation time, Atomic orbitals, Aromatic compounds.

AD-413 403 Div. 25, 8
(TISTE/JWS) OTS price $5.60

Motorola Inc., Chicago, Ill.
SOLID STATE BEAM CONTROLLED LIGHT MODULATOR.
Final rept.
by Evert Lindberg, John Hatchett and Terence Cole. 21 June 61, 43p.
Contract AF30 602 2645, Proj. 5578, Task 557803
RADC TDR63 161 Unclassified report

Report on Solid State Beam Controlled Light Modulator.

Descriptors: (*Modulators, Light), (*Light, Modulation), (*Solid state physics, Light transmission), Feasibility studies, Vacuum, Secondary emission, Degassification, Polarization, Differential equations, Partial differential equations, Integral equations, Vapor plating, Vacuum apparatus, Crystals, Anisotrophy, Ammonium compounds, Phosphorus compounds, Deuterium.

A study and investigation to prove the feasibili-

ty of an electron beam controlled solid-state light modulator are described. Studies were made with different systems. Among these were experiments exhibiting the Pockel's electro-optical effect and the reflex principle. Different types of tubes were used in these experiments; demountable and permanently sealed. Vacuum deposition techniques were also studied. These experiments were performed with one or more of the following type crystals; ammonium dihydrogen phosphate (ADP), potassium dihydrogen phosphate (KDP), and potassium dideuterium phosphate (KD2P). The most promising of the above experiments were the straight-through type tubes using KDP and ADP crystals. A major problem encountered was the high vapor pressure of the crystal material. Thus, it is recommended that the crystal be mounted on the outside of the tube or inside the tube within a sealed volume, or inside the tube with a suitable means of gettering or continuous pumping. (Author)

AD-413 407 Div. 25
(TISTE/AAR) OTS price $1.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
DESIGN OF A MOLECULAR AMPLIFIER GROUP,
by S. Okwit, K. Siegel and J. G. Smith. Jan 63, 49p.
Contract AF33 600 038862, Proj. 4107, Task 410717
ASD TDR63 684 Unclassified report

Descriptors: (*Amplifiers, Design), (*Masers, Design), Traveling wave tubes, Magnetic fields, Noise generators, Measurement, Niobium alloys, Zirconium alloys, Bandwidth, Stability.

This report discusses the results of a study program to design, develop, and fabricate a traveling-wave maser system having a magnetic field that is obtained from a superconducting magnet. The maser utilizes a ruby-loaded comb structure operating at a bath temperature of 4.2 K. It is tunable from 2195 to 2320 Mc, having stable net gains in excess of 30 db with an instantaneous bandwidth of about 17 Mc. Gain stability is accomplished by integrally including yttrium iron garnet isolator disks. Effective maser noise temperature (Te) measurements, made with a hot and cold load noise generator, yielded Te is approximately equal to 7.5 K. (Author)

AD-413 429 Div. 25, 8
(TISTP/WH) OTS price $1.10

IIT Research Inst., Chicago, Ill.
WAVE PROPAGATION UNDER ANOMALOUS CONDITIONS. MEASUREMENT OF THE CHARGE NEUTRALIZATION RATE BETWEEN NO(+) AND O2(-).
Quarterly rept. no. 3, 15 Dec 62-15 Mar 63,
by Carsten M. Haaland. Apr 63, 7p. Rept. no. ARF A218 12
Contract DA36 039SC90762, ARF Proj. A218
Unclassified report

Descriptors: (*Atmosphere, Ionization), (*Ion exchange, Atmosphere), Diatomic molecules, Nitrogen compounds, Oxides, Nitrites, Ions, Vacuum apparatus, Particle accelerators.

AD-413 446 Div. 25
(TISTP/JP) OTS price $3.60

Florence U., Italy.
RADIATION FOR A CHARGED PARTICLE AT OBLIQUE INCIDENCE,
by L. Ronchi, G. Toraldo di Francia. Mar 63, 31p.
Technical note no. 4
Grant AF EOAR62 103
AFCRL 63 167 Unclassified report

Descriptors: (*Charged particles, Photons), Metal films, Electrical conductance, Refractive index, Dielectrics, Energy, Electromagnetic waves, Electron beams, Quantum mechanics, Electromagnetic fields, Surfaces.

The transition radiation is investigated, which is emitted by a charged particle in uniform straight motion, obliquely incident on a thin conducting film, separating two media with different refractive index. General formulas are given. Three particular cases are examined in detail. (Author)

AD-413 455 Div. 25
(TISTP/FR) OTS price $6.60

AVCO Marine Electronics Office, New London, Conn.
BOTTOM LOSS AND RELATED PHENOMENA IN THE TONGUE OF THE OCEAN,
by R. A. Halvorsen. June 63, 59p.
Contract Nonr 3353 00
Unclassified report

Descriptors: (*Underwater sound signals, Ocean bottom), Underwater explosions, Reflection, Scattering, Attenuation.

A series of acoustic tests was made in the Tongue of the Ocean. Eleven runs were made along 5 tracks, although individual runs did not, in all cases, cover a complete track. Two ships were involved in the operation. One towed a hydrophone at a speed of 4 knots. The second followed at various ranges dropping explosives. The primary purpose of these tests was to obtain bottom loss data at grazing angles of 30, 45, and 60 degrees. Data obtained are discussed and compared with other reported data. There is considerable evidence that the bottom is layered and that the main energy in the bottom return is not from the water-bottom interface but from within the bottom itself. This is not an uncommon occurrence and is referred to in the literature. Over a large part of the area surveyed, the bottom appeared to be acting more as a scatterer than a specular reflector. In some instances the scattering characteristics of the bottom changed markedly in short distances (2,000 feet or less). (Author)

AD-413 475 Div. 25, 15
(TISTM/TCG) OTS price $5.60

Maryland U., College Park.
SUPERCONDUCTORS WITH PLANE BOUNDARIES,
by David S. Falk. 19 July 63, 54p. Physics Dept. technical rept. no. 315
Grant AFOSR62 46
AFOSR Rept. no. 5134 Unclassified report

Descriptors: (*Superconductors, Boundary value problems), (*Boundary value problems, Superconductors), (*Mathematical models, Superconductors), Differential equations, Sheets, Metals.

The Gor'kov equations are solved approximately for various geometries to obtain information about the pair wave function in the vicinity of plane boundaries. The approximation method consists of assuming a model taken constant within the superconductor, and assuming it to be close to the correct pair wave function. The equations are then solved and a new pair wave function is calculated. The model is then chosen in a self-consistant manner. The problems considered are the finite and semi-infinite superconducting slabs, and semi-infinite super-

conducting and normal metals in contact. The effects of the boundary conditions are discussed. The calculations are performed both at zero temperature and near the critical temperature. (Author)

AD-413 500 Div. 25
(TISTP/JP) OTS price $1.10

Pennsylvania U., Philadelphia.
REMARKS ON THE OGUCHI TRANSFORMATION,
by Raza A. Tahir-Kheli and Herbert B. Callen.
May 63, 8p. TR11
Contract Nonr55136
Unclassified report

Descriptors: (*Ferromagnetic materials, Low temperature research), (*Ferromagnetism, Mathematical analysis), Series, Boson, Operators (Mathematics), Transformation (Mathematics), Statistical mechanics, Transformation.

It is shown that the Oguchi transformation in the theory of ferromagnetism is a low temperature spin wave approximation, the validity of which depends on the implicit assumption that the kinematical interaction can be ignored. This limitation has the consequence that the theory of Oguchi and Honma, if accepted at higher temperatures, predicts an infinite Curie temperature. (Author)

AD-413 501 Div. 25, 15
(TISTP/HG) OTS price $1.60

University of Southern Calif., Los Angeles.
SOME ASPECTS OF THE THEORY OF IRREVERSIBLE STATISTICAL MECHANICS.
Annual technical rept.,
by H. S. Taylor and J. Stecki. 1963, 11p.
Contract Nonr22823
Unclassified report

Descriptors: (*Statistical mechanics, Irreversible processes), (*Gases, Kinetic theory), Transport properties, Scattering, Potential theory, Particles, Distribution theory, Functions, Numerical analysis, Probability, Operators (Mathematics), Sequences, Statistical processes, Taylor's series.

The version of Bogolyoubov's theory of irreversible phenomena in gases, in which the coupling constant is used as an expansion paramter, is generalized to all orders. (Author)

AD-413 512 Div. 25
(TISTM/BRW) OTS price $9.10

New Mexico U., Engineering Experiment Station, Albuquerque.
WHOLE-FIELD METHODS IN THE MEASUREMENT OF POST-ELASTIC SURFACE STRAINS,
by F. D. Ju. 17 June 63, 103p. Rept. no. ME6
Grant AF AFOSR62 208
Unclassified report

Descriptors: (*Metals, Creep), (*Creep, Photographic analysis), Photoelasticity, Strain (Mechanics), Measurement, Rupture, Polariscopes, Interferometers, Stresses, Aluminum alloys, Theory, Plastic coatings, Surfaces.

Several whole-field methods were studied and a new technique was developed for the purpose of measuring post-elastic surface strains in metals. Critical evaluation was given to the following experimental techniques: the moire effect and the birefringent coating. In both methods, the principal experimental model designed for the study of the techniques was a simple tension plate with a central, circular hole as a stress raiser. Fringe patterns developed in both methods were recorded by photography. (Author)

AD-413 513 Div. 25
(TISTP/JVP) OTS price $1.10

Israel Inst. of Tech., Haifa.
ENERGY BALANCE OF UNIFORMLY ACCELERATED CHARGE,
by Clement Leibovitz and Asher Peres. 23 Apr 63, 10p. Technical note no. 1
Grant AF EOAR63 107
ARL 63 169 Unclassified report

Descriptors: (*Relativity theory, Charged particles), (*Electromagnetic fields, Charged particles), (*Charged particles, Acceleration), Energy, Electromagnetic waves, Particle trajectories, Field theory, Particle accelerators.

If the electromagnetic field of a uniformly accelerated charge is computed by means of Lienard-Wiechert potentials, it is found that the result does not correspond to a single source. Besides the original uniformly accelerated charge there is also a second charge, which is spread on a plane recessing in the opposite direction with the velocity of light. The work performed by this second charge against the electromagnetic field is equal to the constant rate of radiation of the physical system. This resolves the old paradox of the energy balance of a uniformly accelerated charge, which radiates at a constant rate although it undergoes no radiation reaction. (Author)

AD-413 552 Div. 25
(TISTB/MS) OTS price $1.10

Xavier U., Cincinnati, Ohio.
CONFERENCE ON THE FOUNDATIONS OF QUANTUM MECHANICS, OCTOBER 1-6, 1962.
15 July 63, 7p.
Grant Nonr G0006 63
Unclassified report

Descriptors: (*Quantum mechanics, Symposia).

AD-413 560 Div. 25
(TISTP/JP) OTS price $4.60

Aerospace Corp., Los Angeles , Calif.
ASYMPTOTIC WAVE FIELDS AT A CONICAL INTERFACE,
by Herman A. Lang. 19 July 63, 50p. TDR169 3230 22TN4
Contract AF04 695 169
SSD TDR63 155 Unclassified report

Descriptors: (*Conical bodies, Wave transmission), (*Plasma sheath, Wave transmission), Electromagnetic waves, Electromagnetic wave reflection, Ions, Electromagnetic fields, Plasma medicium.

The phase and first erm of the asymptotic reflected, transmitted, and incident fields at a conical interface are determined. The source is an electric dipole located upon and directed along the axis of the cone. Standard asymptotic methods are developed for the dipole in free space when the second medium has a real wave number. The results show how the cone angle and curvature modify the terms of the half space problem, which has been solved previously.

When the second medium has a smaller wave number than free space, the diffracted field that arises because of total reflection is also determined. The results are incorporated in a table. Finally, the results are extended to a second medium consisting of a plasma. The model includes collisions but ion motion is neglected. The phase and amplitude become complex, representing the analytic continuation of the theory applicable to real wave numbers. (Author)

AD-413 570 Div. 25, 14, 8
(TISTM/TCG) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
JOURNAL OF HIGHER EDUCATIONAL INSTITUTIONS, PHYSICS (SELECTED ARTICLES).
3 June 63, 39p.
FTD TT63 350 Unclassified report

Trans. from Izvestiya vysshikh uchebnykh zavedeniy, Fizika, No. 5, pp. 34-37, 38-45, 150-155, and 156-160, 1962.

Descriptors: (*Polyethylene plastics, Dielectric properties), (*Diodes (Semiconductor), Electroforming), (*Polymers, Dielectric properties), (*Ferromagnetic materials, Magnetostriction), Gamma rays, Ultraviolet radiation, Single crystals, X-rays, Iron alloys, Silicon alloys.

Contents: Dielectric properties of insulating materials under gamma-irradiation; Investigation of the electrical forming of point-contract diodes; Variation of dielectric losses in crystallizing polymers under the action of ionizing radiation; and Temperature dependence of the saturation magnetostriction of single crystals of ferrosilicon.

AD-413 575 Div. 25
(TISTP/MFA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AXIALLY SYMMETRICAL DEFORMATION OF HOLLOW ORTHOTROPIC SHELLS OF ROTATION,
by O. M. Guz'. 12 June 63, 4p.
FTD TT63 597 Unclassified report

Trans. from Dopovidi AN Ukrains'koyi RSR, No. 8, pp. 1044-1047, 1962.

Descriptors: (*Structural shells, Bodies of revolution), (*Spheres, Deformation), Elastic shells, Loading (Mechanics), Bessel functions, Rotation, Stresses, Functions, Equations.

AD-413 579 Div. 25, 15
(TISTP/MFA) OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF AUTOMATICALLY MEASURING SMALL DEVIATIONS IN PITCH OF DETAILS WITH PERIODIC STRUCTURES,
by V. N. Zabolotskiy. 17 June 63, 3p.
FTD TT63 500 Unclassified report

Trans. from Russian Patent Nr. 145011, (Appl. Nr. 696354/25, pp. 1-2, 6 Feb 1961.

Descriptors: (*Pitch (Motion), Measurement), (*Structures, Analysis), Beams (Electromagnetic), Helixes.

AD-413 580 Div. 25
(TISTM/REB) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HYSTERESIS LOOPS OF UNTAXIAL FERROMAGNETIC FILMS (Petli Gisterezisa Ferromagnitnykh Plenok),
by V. V. Kobelev. 11 June 63,
FTD TT62 1866 Unclassified report

Trans. from Elektronnyye Vychislitel'nyye Mashiny, Moskva, pp. 1-63, 1961.

Descriptors: (*Ferromagnetic materials, Thin films), (*Thin films, Ferromagnetic materials), (Hysteresis, Thin films), Ferromagnetism, Theory, Rotation.

All the multiformity of hysteresis loops of uniaxial film elements can be described on the basis of a rotation model. Equations for all the classes of hysteresis loops under examination are presented. The closest congruity of the theory based on the rotation model with the experiment is observed under specimens with similar values of coercive force for wall shiftings and for rotations. The experimental manifestation of processes of wall shifting are more graphically and easily carried out by examining the hodograph of magnetization. In all the cases investigated, the magnetic reversal of film elements is accompanied by domain formation. The share of the processes of wall shifting is minimal through the action of the external field near the heavy direction of magnetization. With magnetic reversal of the film element exactly along the light direction and exactly along the left direction of the magnetization processes, rotation of the magnetic moment of the specimen is not observed. (Author)

AD-413 583 Div. 25
(TISTM/EJH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF DISPERSE ATOMIZATION IN NOZZLES OPERATING ON THE PRINCIPLE OF THE BILATERAL WASHING OF A LIQUID SURFACE WITH GAS,
by I. G. Plit. 15 May 63, 20p.
FTD TT63 290 Unclassified report

Trans. from Zhurnal Prikladnoy Khimii, 35:9, pp. 1996-2007, 1962.

Descriptors: (*Atomization, Nozzles), (*Sprays, Atomization), (*Nozzles, Atomization), Drops, Liquids, Surfaces, Gases.

When investigating the influence of the basic parameters on the dispersity of a spray of liquids in low-pressure pneumatic nozzles, it was established that there are two characteristic regions, depending on atomization conditions, in which the mean drop diameter changes according to various regularities. Generalized equations were obtained for each indicated region for determining the critical point of transition from one dependence to the other. (Author)

AD-413 591 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF LIQUID PHASE ON THE PROCESS OF SILICA CRYSTALLIZATION,

by V. A. Bron. 10 May 63, 4p.
FTD TT63 512 Unclassified report

Trans. from Doklady Akademii Nauk SSSR, (Khimicheskaya Tekhnologiya). 59:3, pp. 535-536, 1948.

Descriptors: (*Silicon compounds, Crystallization), (*Dioxides, Crystallization), (*Crystallization, Silicon compounds), (*Liquids, Phase studies), Viscosity, Mixtures, Minerals, Additives, Heat treatment, Group I elements, Group II elements, Group III elements, Oxides.

AD-413 657 Div. 25
(TISTP/MFA) OTS price $8.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE SOLUTION OF CERTAIN NONSTEADY-STATE PROBLEMS OF MAGNETOHYDRODYNAMICS FOR A VISCOUS INCOMPRESSIBLE FLUID.
by O. A. Ladyzhenskaya and V. A. Solonnikov. 22 May 63, 83p.
FTD TT 63 208 Unclassified report

Trans. from Trudy Matematicheskogo Instituta Imeni V. A. Steklova, Matematikcheskiye Voprosy Gidrodinamiki i Magnitnoy Gidrodinamiki Dlya Vyazkoy Neszhimayemoy Zhidkost', Akademiya Nauk Soyuza Sovetskikh Sotsialisticheskikh Respublik, Vol. 59, Moskva, pp. 115-173, 1960.

Descriptors: (*Magnetohydrodynamics, Equations), (*Incompressible flow, Theory), Viscosity, Electromagnetic fields, Inequalities, Fluid flow, Nonlinear differential equations, Boundary valve problems, Transformations (Mathematics), Determinants, Surfaces.

AD-413 662 Div. 25
(TISTP/FEM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE PROBLEM OF TRANSVERSE INSTABILITY OF CHARGED BEAMS IN STORAGE SYSTEMS.
by V. G. Grishin. 11 June 63, 5p.
FTD TT63 530 Unclassified report

Trans. from Vestnik Moskovskogo Universiteta, no. 6, pp. 83-85, 1962.

Descriptors: (*Space charges, Storage), (*Particle beams, Density), Nonlinear systems, Oscillators, Frequency, Phase studies, Distribution, Stability, Particle accelerators, Motion, Betatrons, Equations, Integral transforms, Plasma oscillations.

Certain transverse effects of a space charge in cyclic systems are investigated. A beam is examined in which the particles perform nonlinear oscillations with the same energy. The field of the formed positive density fluctuations accelerates the particles moving in front of the fluctuations and slows down the particles located behind it. (Author)

AD-413 667 Div. 25
(TISTP/AMS) OTS price $5.40

Hughes Tool Co., Culver City, Calif.
CADMIUM SULFIDE SUMMARY REVIEW AND DATA SHEETS
by M. Neuberger. Apr 63, 155p. Rept. no. DS124
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Cadmium compounds, Sulfides), Semiconductors, Absorption, Optical properties, Diffusion, Dielectric properties, Electrical conductance, Resistance (Electrical), Hall effect, Radiation damage, Life expectancy, Thermoelectricity, Photoconductivity, Refractive index, Reflection, Data, Experimental data.

AD-413 692 Div. 25, 30
(TISTP/TL) OTS price $6.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 13, 1 Apr-31 May 62.
by James. L. Huang. Aug 63, 68p. Rept. no. AL62L023
Contract NObs78552
Unclassified report

Descriptors: (*Roller bearings, Vibration), (*Ball bearings, Tests), (*Shafts, Calibration), Loading, Capacitance bridges, Measurement, Tables.

AD-413 760 Div. 25, 4
(TISTM/ODN) OTS price $1.10

Mississippi U., University.
DETERMINATION OF SPECTROSCOPIC AND THERMODYNAMIC CONSTANTS FOR A SYSTEM OF 1:1 AND 2:1 COMPLEX EQUILIBRIUM REACTIONS.
by Neil B. Jurinski. 1963, 7p.
AFOSR 4954 Unclassified report

Descriptors: (*Thermodynamics, Chemical reactions), (*Chemical equilibrium, Thermodynamics), (*Reaction kinetics, Thermodynamics) Absorption (Physical), Complex compounds, Ultraviolet spectroscopy, Theory.

A method of determining the formation constants and the molar absorbancy indices of several complex systems is described. It is shown that observed variations in the apparent formation constant with wavelength or concentration (based on the assumption of only 1:1 interactions) may be attributable to consecutive or simultaneous formation of higher order complexes. (Author)

AD-413 768 Div. 25
(TISTM/ODN) OTS price $2.60

University of Southern Calif., Engineering Center, Los Angeles.
RESEARCH IN PLASMA AND MAGNETOHYDRODYNAMICS.
Technical rept.,
by Zohrab Kaprielian. Mar 63, 16p.
USCEC Rept. 96 101; EE21
Grant AF AFOSR 62 112, Proj. 9768
Unclassified report

Descriptors: (*Plasma physics, Magnetohydrodynamics), Thermal radiation, Sources, Electron density, Microwaves, Measurement, Parametric amplifiers, Electromagnetic waves, Theory.

The research reported here involves theoretical and experimental work in five major areas: (1) Electromagnetic Radiation from a Dipole in an Anisotropic Plasma, (2) Plasma Diagnostics, (3) Modified P.I.G. Discharge Hot Plasma Source, (4) Plasma Parametric Amplifier, (5) Measurements of Thermal Radiation from a Highly Ionized Current Carrying Plasma. The results of these investigations are reviewed briefly. (Author)

AD-413 769 Div. 25
(TISTP/HG) OTS price $4.60

Free U., Berlin (Germany).
THE HYDRODYNAMIC EQUATIONS FOR DI-ATOMIC, EXCITED AND DISSOCIATED GASES AS APPROXIMATIONS OF THE BOLTZMANN EQUATIONS DESCRIBING SUCH GASES.
Technical rept. no. 5, pt. 2,
by G. Ludwig. 1 Apr 63, 45p.
Grant AF EOAR61 48
AFOSR 4590, pt. 2 Unclassified report

Descriptors: (*Fluid dynamics, Theory), (*Gases, Excitation), Dissociation, Momentum, Diatomic molecules, Electron transitions, Numerical analysis, Integral equations, Energy, Parity, Transformations (Mathematics), Mechanics.

AD-413 784 Div. 25, 20
(TISTP/MB) OTS price $4.60

General Dynamics Astronautics, San Diego, Calif.
MOLECULAR AND IONIC IMPACT STUDIES.
Annual rept., 15 July 62-14 July 63,
by D. McKeown, A. Cabezas, B. W. Scott and M. G. Fox. 14 July 63, 43p. Rept. no. GDA63 0592
Contract Nonr315700, Task NR012 403
Unclassified report

Descriptors: (*Molecular beams, Ion bombardment), (*Surface, Solids), (*Nuclear particles, Analysis), Ion sources, Metals, Electrons, Measurement, Ionization potentials, Work functions, Excitation, Helium group gases, Atomic properties, Molecular properties, Scattering, Nuclear cross sections, Particle trajectories, Satellites (Aritificial), Orbital trajectories, Gold, Silver, Copper, Impact shock.

AD-413 792 Div. 25, 8
(TISTM/AM) OTS price $10.10

Oklahoma U., Research Inst., Norman.
A DIRECT METHOD FOR MEASURING LIFETIMES OF EXCITED ATOMIC STATES AND ITS APPLICATION TO HELIUM,
by Thomas M. Holzberlein. May 63, 118p.
Contract AF49 638 639, Proj. 9751, Task 37511
AFOSR 4961
Unclassified report

Descriptors: (*Life expectancy, Helium), (*Helium, Excitation), Data, Electron density, Test equipment, Measurements, Phase shifters, Amplifiers, Pressure, Electric current, Anodes (Electron tubes), Relaxation time, Theory, Emissivity, Differential equations, Probability, Integral equations, Space charges, Electron beams, Atomic energy levels, Photons, Absorption, Energy, Design, Electronic equipment, Operation, Consturction, Cathodes (Electron tubes), Ions, Photomultipliers, Vacuum, Circuits, Pulse generators.

AD-413 810 Div. 25
(TISTM/ODN) OTS price $3.60

Minnesota U., School of Chemistry, Minneapolis.
THEORY OF ABSORPTION LINE SHAPES IN MONATOMIC GASES. II. METHOD OF ''QUASI-MOMENTS,
by C. Alden Mead. 1962, 28p.
Contract AF49 638 940
AFOSR 4870 Unclassified report

Descriptors: (*Gases, Absorption spectrum), Atomic properties, Refractive index, Theory, Moments, Atomic spectroscopy, Line spectrum.

The Kronig-Kramers theorem leads to a relation between the coefficients in an asymptotic expansion of the refractive index in the far wings of an absorption line and certain integral properties, called 'quasi-moments', of the absorption line. The quasi-moments, or Q-moments, are related to the ordinary moments when the latter exist, and can be qualitatively related to such commonly measured quantities as the half width. Since the asymptotic coefficients are relatively easy to evaluate, this leads to a simple way of getting theoretical predictions for some properties of the line shape. The method is applied to the theory of a preceding paper, and results are obtained which are in qualitative agreement with experimental linewidths. It is also possible to take into account the correction to the strong linearity assumption made previously. The correction leads to a narrowing of the line ('non-linear narrowing') which is in the right direction to remove the remaining discrepancy between theory and experiment. (Author)

AD-413 825 Div. 25, 32
(TISTM/TCY) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
MAGNESIUM STANNIDE DATA SHEETS,
by M. Neuberger, Oct 62, 23p.
Contract AF33 616 8438 ; Proj 7381; Task 738103
Unclassified report

Descriptors: (*Magnesium alloys, Electrical properties), (*Tin alloys, Magnetic properties), (*Data, Intermetallic compounds), (*Bibliographies, Intermetallic compounds), Hall effect,Absorption, Electrical conductance, Atomic energy levels, Photoelectrons, Photoelectric effect, Resistance (Electrical), Thermal conductivity, Thermoelectricity, Tables.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Magnesium Stannide. (Author)

AD-413 849 Div. 25
(TISTM/ODN) OTS price $1.10

Minnesota U., Minneapolis.
VISCOSITY OF CONCENTRATED SUSPENSIONS OF SPHERICAL PARTICLES,
by Harold L. Weissberg and Stephen Prager.
1963. 3p.
Contract AF49 638 720
AFOSR Rept. no. 4871 Unclassified report

Descriptors: (*Viscosity, Theory), (*Spheres, Viscosity), Colloids, Equations, Particles, Mathematical models, Vector analysis.

Division 25 - PHYSICS

AD-413 870 Div. 25, 4
(TISTM/ODN) OTS price $1.10

California U., Berkeley.
SPECTROSCOPIC AND THEORETICAL STUDIES OF MOLECULES WITH BONDING WHICH DEVIATES FROM NORMAL VALENCE RULES.
Terminal rept., 1 Mar 61-28 Feb 63,
by George P. Pimentel, Brian Brocklehurst, M. Bulanin, Stuart Charles, R. T. Hall and others.
May 63, 9p.
Contract AF49 638 944
AFOSR Rept. no. 4951 Unclassified report

Descriptors: (*Chemical bonds, Theory), (*Infrared spectroscopy, Molecular properties), (*Molecules, Chemical bonds), Valence, Free radicals, Boron compounds, Hydrides, Oxygen, Atoms, Cryogenics, Solidified gases, Frequency shift.

Research was devoted to the elucidation of the structural properties and chemical bonding of molecules with bonding that deviates from normal valence rules. Effort was focused on three lines of attack. (1) Spectroscopic studies of the reactivity and molecular structure of free radicals and reactive molecules using the matrix isolation method. (2) Spectroscopic studies of stable molecules selected to develop and expand the applicability of the matrix isolation method. (3) Development of new and novel spectroscopic techniques to facilitate future infrared studies of chemical species with extreme reactivity. (Author)

AD-413 876 Div. 25
(TISTM/ODN) OTS price $1.10

Utah U., Salt Lake City.
THE EFFECT OF THIN FILM-COATED APERTURES ON OPTICAL DIFFRACTION PATTERNS,
by F. S. Harris Jr. 1963, 3p.
Grant AFOSR62 226
AFOSR J715 Unclassified report

Presented at the Second Hungarian Optical Conference, 6-10 May 1963, Budapest.

Descriptors: (*Diffraction, Theory), Films, Polarization, Optical phenomena.

AD-413 888 Div. 25
(TISTP/JEA) OTS price $1.60

Stanford Electronics Lab., Stanford U., Calif.
EXCITATION OF FIELD-ALIGNED SOUND WAVES BY ELECTRON STREAMS,
by O. Buneman. Apr 63, 7p. SR1; SEL63 030
Contract AF19 628 233, Proj. 8653
AFCRL DASA 63 497 528 61
Unclassified report

Descriptors: (*Sound transmission, Excitation), (*Electron beams, Wave transmission), (*Excitation, Electron beams), Plasma oscillations, Phase studies, Sound, Ionospheric disturbances, Magnetic fields, Momentum, Ions, Elastic scattering, Drift, Velocity Electromagnetic waves, Ionosphere, Plasma physics.

Irregularities moving across the magnetic field in aurorae and electrojets are explained as sound waves excited by streaming electrons. A three-component gas dynamical analysis (neutrals, ions, electrons) predicts growth of waves propagating across the field with velocity (8 KT/3m)/2 provided the streaming velocity reaches a certain threshold which is somewhat higher than this value, and the waves will travel more slowly than (8 KT/3m)/2 when the electrons are a good deal faster than the threshold, which would account for an observed velocity spread. (Author)

AD-413 923 Div. 25, 30
(TISTP/MFA) OTS price $3.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
RESPONSE OPERATORS FOR WATER WAVE PARTICLE VELOCITY AND ACCELERATION,
by R. E. Schiller, Jr. 24 June 63, 1v.
NCEL Technical note no. 527
Unclassified report

Descriptors: (*Water waves, Analysis), (*Particles, Velocity), Acceleration, Fourier analysis, Theory, Digital computers, Equations, Integration, Motion.

Response operators in the form of Fourier series are presented for horizontal component of water wave particle velocity and acceleration at elevations (z): 35.0 ft, 26.2 ft, 17.4 ft, 8.7 ft, -0.6 ft, -14.8 ft, -41.1 ft, and -74.5 ft MWL in water 97.5 feet deep. Procedures developed by Reid (1958, Proc. 6th Conf. Coastal Eng.) were used. It was found that the digitizing (integration) interval (delta t) giving adequate fit with theory was different for velocity as compared to acceleration. A value of delta t = 0.1 second was used for all velocity computations and a value of delta t = 1.0 second was used for all acceleration computations. The smallest number of Fourier coefficients (M) necessary to give an adequate fit to the theoretical response operators varied considerably, ranging from M = 300 for z = 35.0 (velocity) to M = 16 for z = -74.5 (acceleration). (Author)

AD-413 936 Div. 25, 8
(TISTP/PCR) OTS price $3.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
EXCITATION OF SURFACE WAVES ON A UNIDIRECTIONALLY CONDUCTING SCREEN BY A PHASED LINE SOURCE,
by S. N. Karp and F. C. Karal. July 63, 24p.
Research rept. no. EM 183
Contract AF19 604 5238, Proj. 5635, Task 56350
AFCRL 63 19 Unclassified report

Descriptors: (Electromagnetic fields, Vector analysis), Electromagnetic waves, Electric fields, Magnetic fields, Mathematical analysis, Integral equations, Theory, Electronics.

This paper considers the excitation of surface waves on an unidirectionally conducting screen produced by a phased line source located above the screen and perpendicular to the wire elements. The screen consists of an infinite number of straight, perfectly conducting, parallel wires. The screen is conducting only in the direction of the wire elements. The boundary conditions prescribed on the screen are the following: (1) the electric field component parallel to the wires is zero on both sides of the screen, (2) the component of the electric field normal to the wires is continuous across the screen, and (3) the component of the magnetic field parallel to the wires is continuous across

the screen. The source of the electromagnetic field is a phased line source located above the screen and oriented in a direction perpendicular to the wire elements. The phased line source consists of a periodic line current with an electric charge distributed along its length. The complete electromagnetic field is determined exactly and simple expressions for the scattered far field are given. Surface waves are shown to exist and simple expressions for their amplitudes are presented. (Author)

AD-413 937 Div. 25
(TISTM/AM) OTS price $3.60

Noyes Chemical Lab., U. of Illinois, Urbana.
NMR STUDIES OF PHASE TRANSITIONS,
by C. K. Coogan and H. S. Gutowsky. 28 June 63, 29p. Technical rept. no. 66
Contract Nonr183413, Task NR041 215
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Phase studies), Crystal structure, Crystal lattices, Moments, Chlorides, Sodium compounds, Isotopes, Ions, Resonance, Heat of activation, Protons, Sulfides.

NaSH is one of a group of compounds M(QR) whose high temperature crystalline form might be called pseudo-NaCl cubic, but which crystallize in less symmetrical lattices at low temperatures. In the high temperature form the SH(-)ion is located at the Cl(-) site of the NaCl lattice. There have been two models proposed in the past to account for the obviously linear ion QR(-) replacing a spherical ion. Pauling proposed a model in which the QR(-) ion is tumbling spherically very rapidly and thus presents an outward spherical form to the surrounding ions. Frenkel proposed a model in which the QR(-) ions are static, and point along the cube body diagonals (<111> directions), each QR(-) ion thus having eight possible static orientations. In this model a random distribution of QR(-) orientations among the eight possibilities leads to long-range cubic symmetry. Previous attempts, based on X-ray diffraction experiments, to decide between these models have been unsuccessful. (Author)

AD-413 954 Div. 25, 32
(TISTM/TCG) OTS price $2.60

Hughes Aircraft Co., Culver City, Calif.
GALLIUM PHOSPHIDE. DATA SHEETS,
by M. Neuberger. Sep 62, 23p. Rept. no. DS111
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Gallium alloys, Semiconductors), (*Phosphorus alloys, Semiconductors), (*Materials, Data), (*Bibliographies, Semiconductors), Tables, Absorption, Optical properties, Dielectric properties, Electrical conductance, Acoustic properties, Emissivity, Electroluminescence, Atomic energy levels, Photoelectrons, Photoelectric effect, Reflection, Refractive index.

The Electronic Properties Information Center was established to collect, index and abstract the literature on the electrical and electronic properties of materials and to evaluate and compile the experimental data from that literature. A modified coordinate index to the literature is machine stored and printed for manual use. The Center publishes data sheets, summary reports, thesauri, glossaries, and similar publications as sufficient information is evaluated and compiled. This report consists of the compiled data sheets on Gallium Phosphide. (Author)

AD-413 974 Div. 25
(TISTP/MFA) OTS price $8.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STRUCTURAL RESPONSE TO INTENSE ELECTROMAGNETIC RADIATION.
Second annual technical rept., 1 Mar 62-28 Feb 63,
by Robert C. Good, Jr. 28 Feb 63, 80p.
Contract AF49 638 1030, Proj. 9782, Task 37718
AFOSR 5096 Unclassified report

Descriptors: (*Electromagnetic pulses, Measurement), (*Exploding wires, Plasma medium), Electromagnetic waves, Instrumentation, Theory, Circuits, Resistance (Electrical), Capacitors, Pressure, Electric shunts, Radiation measurement, Detection, Crazing, Absorption, Temperature, Glass, Thermal conductivity, Specific heat, Thermal stresses, Shock waves, Thermocouples, Phototubes, Emissivity, Pyrometers, Tests, Bibliographies, Energy conversion, Ultraviolet radiation.

An exploding wire apparatus has been used to study conversion of electrical energy into strain energy in glass samples that have been either irradiated by the electromagnetic waves emitted by the wire or enveloped by plasma formed by the wire. The strain energy left permanent marks on the sample as discoloration, weight loss, and surface cracks. These were used to confirm the theoretical analysis as to method and to dimensions. Conversion of energy within the sample was postulated to involve thermal absorption, diffusion, and strain. The thermal diffusion equation was solved and values computed for the heating and cooling portions of the pulse. By linking the quantity of material heated with experimental measurements, an overall absorption coefficient for glass of 1000 per cm and an energy deposition of 1/2 joule/sq cm was found. (Author)

AD-413 976 Div. 25, 8, 20
(TISTP/FEM) OTS price $7.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 2, 16 Mar-15 June 63. 15 June 63, 66p. Rept. no. CU6 63
Contract DA36 039sc90789, Proj. NR372 101, Task 3A99 20 001 09
Unclassified report

Descriptors: (*Helium, Life expectancy), (*Ionization, Helium), (*Atomic spectroscopy, Optical phenomena), (*Molecular beams, Masers), Magnetic moments, Nuclear spins, Isotopes, Quenching (Inhibition), Cadmium, Lithium, Chromium, Hyperfine structure, Potassium, Rubidium, Infrared optical systems, Cryostats, Microwave frequency, Optical filters, Resonance, Magneto-optic effect, Magnesium, Oxides, Scattering, Mass spectroscopy, Magnetrons, Signal generators, Superconductors, Radio astronomy, Planetary atmosphere, Superhigh frequency.

The nuclear spin and magnetic moment of 55 hour Cd-115 have been determined by optical double resonance. Positive identification of the isotope was obtained by the observation of the decay of the resonances. The atomic g factor for the (5s5p)-3P(1) state of Cd has been determined to 10 ppm with a K band optical double resonance spectrometer. Metastable autoionizing states have been discovered in potassium and rubidium

and it has been shown that these can be quenched with an electric field (Stark quenching). The hyperfine structure of the (4s4p)-3P(1) state of Zn-67 has been redetermined. Level crossings have been detected in the (3d)-5-4p and (3d)-4-4s4p configurations of chromium; the lifetimes of these states were determined from the widths of the crossing resonances. (Author)

AD-413 996 Div. 25, 27
(TISTM/BRW) OTS price $8.60

Rohm and Haas Co., Huntsville, Ala.
ENGINEERING RESEARCH.
Quarterly progress rept.
29 July 63, 92p. Rept. no. P63 13
Contract DA01 021ORD11878
Unclassified report

Descriptors: (*Solid rocket propellants, Mechanical properties), (*Disks, Stresses), (*Stresses, Mathematical analysis), Strain (Mechanics), Difference equations, Integral transforms, Elasticity, Theory, Partial differential equations, Viscoelasticity, Numerical analysis, Series.

The stresses, strains, and displacements in the poker chip test specimen were found using a finite difference technique which was developed and reported previously. The results are presented in dimensionless form as functions of two variables: the ratio of diameter to thickness and Poisson's ratio. A bonded end tensile specimen was also analyzed with the same procedure, and the deviation of the stress distribution from uni-axial tension which occurs near the bonded ends was illustrated. (Author)

AD-414 082 Div. 25
(TISTP/FEM) OTS price $2.60

Cambridge Language Research Unit (Gt. Brit.).
THE CALCULATION OF CONSTANTS OF THE STABLE PARTICLES,
by E. W. Bastin and A. F. Parker-Rhodes.
1962, 21p. Rept. no. ISU 8
Contract AF 61 052 331
AFOSR 5050 Unclassified report

Descriptors: (*Control systems, Models (Simulation), (*Particles, Algebras), Field theory, Quantum mechanics, Matrix algebra, Topology, Vector analysis, Protons, Sampling, Electric fields, Electric potential, Theory, Stability, Analog computers, Mathematical models, Spin, Electrons.

AD-414 094 Div. 25
(TISTM/ODN) OTS price $1.60

Princeton U., N. J.
RECOMBINATION OF ATOMS AT THE SURFACE OF THERMOCOUPLE PROBES,
by Kin Tsu and M. Boudart. 1963, 14p.
Contract AF49 638 32
AFOSR 51 Unclassified report

Presented at the Symposium on Atomic Reactions, Sep 1960, Montreal, Canada.

Descriptors: (*Recombination reactions, Surfaces), Metals, Catalysis, Cylindrical bodies, Thermocouples, Atoms, Theory, Differential equations, Gas discharges, Reaction kinetics.

When atoms produced by a discharge at one end of a closed cylindrical tube diffuse down the tube, their rate of recombination on the walls of the tube can be determined by measuring the temperature of a probe traveling along the axis of the tube. However, the catalytic activity of the probe may, under specified conditions, appear to be the same whatever the catalytic activity of the probe material. This effect is offered as a possible explanation of the findings of Wood and Wise who recently reported essentially the same recombination probability for hydrogen atoms on twelve different metals. (Author)

AD-414 096 Div. 25
(TISTM/BRW) OTS price $1.00

Adelphi Research Center, Mineola, L. I., N. Y.
VALIDITY OF THIN PLATE THEORY IN DYNAMIC VISCOELASTICITY.
Final rept., May 61-Apr 63,
by M. A. Biot and F. V. Pohle. July 63, 26p.
Contract AF33 616 8274, Proj. 7351, Task 735106
ASD TDR63 411 Unclassified report

Descriptors: (*Viscoelasticity, Theory), (*Vibration, Damping), (*Sheets, Resonance), Absorption, Shear stresses, Elasticity, Numerical analysis, Deformation, Structural shells, Surfaces, Stresses, Dynamics, Loading (Mechanics), Deflection, Equations.

Resonance damping for a vibrating plate is investigated both according to the exact equations of dynamical viscoelasticity and the classical thin-plate equations derived in mechanics of materials. The plate is assumed as isotropic and homogeneous and no shear or rotatory inertia corrections have been included in the thin-plate approximations. Two types of materials are investigated which correspond to real and complex values of the bulk modulus. For each case the complex shear modulus is u(1+ig) and values of g up to 0.10 were used in the calculations. The two theories are in excellent agreement in a range of wavelengths as low as about ten times the thickness. It is found that thin-plate theory evaluates the damping more accurately than the static rigidity. (Author)

26. PRODUCTION AND MANAGEMENT

AD-411 757 Div. 26, 8
(TISTP/FEM) OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF COOLING WINDINGS AND CORES OF ELECTROMAGNETIC PUMPS, DOSAGE METERS AND LIQUID METAL MIXERS,
by L. A. Verte. 18 June 63, 3p.
FTD TT63 497 Unclassified report

Trans. from Russian Patent Nr. 143983, (Appl. Nr. 722420/22, pp. 1-2, 17 Mar 61.

Descriptors: (*Cooling, Coils), (*Coolants, Gallium), Manufacturing methods, Metals, Liquid metals, Liquid metal pumps, Electromagnetic pumps, Dosimeters, Melting, Boiling, Temperature.

AD-411 827 Div. 26
(TISTE/OHD) OTS price $10.10

SKF Industries Inc., Philadelphia, Pa.
ANALYTICAL STUDY OF THE RADIAL, AXIAL AND ANGULAR VIBRATION OF A BEARING WITH FLEXURALLY RIGID RACES.
Special rept.
3 Apr 62, 1v.
Contract NObs78552, Proj. NE071 200
Unclassified report

Report on Study of the Vibration Characteristics of Bearings.

Descriptors: (*Ball bearings, Vibration), (*Vibration, Analysis), Rotation, Frequency, Mathematical analysis, Algebra, Differential equations.

In the present report, a study of the motion of the outer ring is made. The vibration of the outer ring in the radial and axial direction, as well as the angular vibration (wobble) is studied. (Angular motion is experimentally and analytically distinguishable from axial motion). The outer ring is considered flexurally rigid, supported by the balls and by a radially and angularly elastic housing. Axially, the housing applies a constant force. As in a previous study, the ball mass is taken to be negligible, zero damping is assumed and the elastic deformation at the ball contacts, as well as the radial and angular deformations of the housing are assumed to be linear in the amplitude range considered. (Author)

AD-411 829 Div. 26
(TISTE/OHD) OTS price $5.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept no. 16, 1 Oct-30 Nov 62,
by Robert J. Finkelston and James L. Huang.
30 Nov 62, 49p.
Contract NObs78552, Proj. NE071 200
Unclassified report

Descriptors: (*Roller bearings, Vibration), (*Ball bearings, Tests), Test methods, Experimental data, Theory.

The vibration characteristics of a cylindrical roller bearing were studied and a comparison of these characteristics with those of other bearings is made. An improved cylindrical roller bearing was vibration tested and the effect of waviness on the vibration level of the bearing was studied analytically in a manner similar to that of the improved spherical roller bearings. The vibration of ball bearings of basic 6305 size with special design features and components of low waviness was studied and comparisons are made with bearings of various sizes having good vibrational quality. (Author)

AD-411 881 Div. 26, 17, 12
(TISTM/BRW) OTS price $1.60

Goodyear Aircraft Corp., Akron, Ohio.
STRUCTURAL FABRIC PROGRAM.
Interim technical progress rept., 1 Apr-30 June 63,
by J. O. Miller. 30 June 63, 1v.
Contract AF33 600 43036, ASD Proj. 7 904
ASD TR7 904, vol. 8 Unclassified report

Descriptors: (*Inflatable structures, Metallic textiles), (*Industrial equipment, Inflatable structures), (*Textiles, Machines), Gliders, Reentry vehicles, Design, Wire, Stainless steel.

The purpose of this program, as related to aerospace application, is to provide a means of manufacturing large low-density AIRMAT structures made of metallic cloth and yarns capable of small volume packaging. Design work was completed, the loom was assembled and preliminary checkout was commenced. The aforementioned efforts are directed toward the development of a loom procurement specification and the actual procurement of a loom capable of producing a low-density AIRMAT in the order of 20 feet wide with a maximum depth of 8 feet. (Author)

AD-411 917 Div. 26, 17
(TISTM/AMS) OTS price $1.60

New England Materials Lab., Inc., Medford, Mass.
DISPERSION STRENGTHENED NICKEL-BASE ALLOYS.
Progress rept. no. 2, 1 May-30 June 63,
by A. S. Bufferd, R. C. Nelson, and N. J. Grant.
1 Aug 63, 8p.
Contract N600 19 59891
Unclassified report

Descriptors: (*Dispersion hardening, Nickel alloys), (*Nickel alloys, Dispersion hardening), Tensile properties, Ductility, Stresses, Rupture, Chromium alloys, Powder metallurgy, Extrusions, Thorium compounds, Oxides, Powder metals.

A series of dispersion strengthened Nichrome-thoria alloys prepared by mechanical mixing techniques showed no mechanical property improvement relative to the base composition, Nichrome. Attempts at introducing the dispersion of thoria by decomposition of thorium nitrate onto Nichrome powder have been initiated. (Author)

AD-411 963 Div. 26, 30
(TISTP/FEM) OTS price $9.60

System Development Corp., Santa Monica, Calif.
SIMULATION METHODS AND MODEL DESIGN,
by James R. Crawford. 19 June 63, 113p.
TM765 000 00
Unclassified report

Descriptors: (*Models (Simulation), Design), (*Simulation, Management engineering), Abstracts, Documentation, Control systems, Analysis, Data processing systems, Decision making, Programming (Computers), Scheduling, Operations research.

Forms, procedures and processes for a large simulation model are described. An organized method for defining terms and expressing the flow of information and products is presented. With the accounting machine processes of sort, reproduce and list, industrial engineers can use the method to analyze extensive systems and quickly implement new procedures with no conflict of instructions. (Author)

AD-412 282 Div. 26, 25, 8
(TISTP/FEM) OTS price $1.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
VACUUM DE-GASSING OF ENCAPSULANTS,

by A. DeFelice. June 61, 17p. Rept. no. MRI267 01
Unclassified report

Descriptors: (*Encapsulation, Manufacturing methods), (*Modules (Electronic), Degasification), Vacuum apparatus, Epoxy plastics, Polyethylene plastics, Temperature, Tests, Bubbles, Crazing, Hardness, Casting.

Processes and techniques for the operation of the Vacuum Impregnator for de-gassing the resins used for encapsulating electronic modules is reported. A total of 225 distinct tests were run using 9 different resin formulations. Resin types included epoxies and polyurethanes. Two factors, pre-mix temperature of ingredients and application of vacuum were varied. The resulting samples were evaluated for bubbles, cracks, crazing and hardness. Application of vacuum to batches prior to casting and curing proved effective for de-gassing encapsulating materials for most of the formulations tested. Taken Overall the results varied widely, ranging from perfect to unacceptable. (Author)

AD-412 323 Div. 26
(TISTM/AMS) OTS price $1.60

IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF 2400 F FORGING DIE SYSTEM.
Interim technical progress rept., 28 Mar-27 June 63,
by P. R. Gouwens, H. Nudelman, and T. Watmough. July 63, 12p.
Contract AF33 600 42861, ASD Proj. 7 886 and ARD Proj. 2220
ASD TR7 886, Vol. 9 Unclassified report

Descriptors: (*Dies, Forging), (*Forging, Dies), (*High temperature research, Dies), Silicon compounds, Carbides, Tungsten alloys, Molybdenum alloys, Resistance (Electrical), Heating, Flames, Calcium compounds. Fluorides, Sodium compounds, Salts, Tests.

The basic die assembly previously constructed for prototype work is satisfactory for supporting the actual working dies and their retainer rings. The material selections have been made for these parts and will utilize a self-bonded SiC as the upper male die, an 85% W-15% Mo cast lower die, and the 97% W-15% Mo retainer ring assembly for both dies. The attainment of 2400 F at the male die insert and 2300 F at the bottom die cavity has been demonstrated using a combination of electrical resistance heating in the die base and flame heating of the die impressions. Protection of the metallic dies at these temperatures is by means of a CaF-NaF salt mixture. (Author)

AD-412 411 Div. 26, 17, 25
(TISTM/AMS) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
METALWORKING APPLICATIONS OF LASERS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Helen B. McCormick. Feb 63, 25p. Special bibliography SB63 22; Rept. no. 5 73 63 5
Unclassified report

Descriptors: (*Metallurgy, Lasers), (*Lasers, Metallurgy), (*Bibliography, Lasers), Welding, Machining, Melting, Vaporization, Material removal, Drills, Ruby, Masers, Cutting tools, Design, Electrical engineering, Manufacturing methods, Electronics, Stainless steel, Abstracts, Reports, Titanium alloys, Alloys, Tungsten, Aluminum, Nickel, Diamonds, Molybdenum, Crystals, Crystal structure, Laboratory equipment, Medicine, Photography.

Applications of lasers in metalworking are reported with excerpts, summaries and quotations pointing out the most relevant information in the items reviewed. Metalworking applications include welding, machining, piercing and drilling, melting and vaporizing, fabrication of refractory materials, and the microwelding and micromachining of fragile components and interconnections for electronics and optical communications uses. Measuring and gaging applications, high speed photography, high temperature testing of materials characteristics are other likely applications mentioned. References are made also to safety precautions for laser use, and to components and equipment now available for experimental or shop use. (Author)

AD-412 731 Div. 26, 30
(TISTP/WH) OTS price $4.60

Operations Research Center., U. of Calif., Berkeley.
MONTE CARLO METHODS AND THE PERT PROBLEM.
by Richard M. Van Slyke. 14 May 63, 1v. Rept. no. ORC63 11 (RR)
Contract Nonr22283
Unclassified report

Descriptors: (*Monte Carlo method, Operations research), (*Scheduling, Monte Carlo method), Stochastic processes, Management engineering, Networks, Analysis of variance, Statistical analysis.

The purpose of this paper is to try to characterize the qualitative aspects of individual networks which indicate whether the reduction of a stochastic longest path problem to a deterministic one is adequate and to some extent to estimate the magnitude of the errors involved. (Author)

AD-412 797 Div. 26, 12, 27, 30
(TISTP/JEA) OTS price $3.60

Hercules Powder Co., Bacchus, Utah.
STRUCTURAL HYDROBURST TEST MINUTEMAN STAGE III WING II CASE. WEAPON SYSTEM 133A.
Final rept.,
by T. W. Barnes. 7 Aug 63, 27p. Rept. no. MTI486
Contract AF04 647 243
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Tests), (*Rocket cases, Rocket motors (Solid propellant)), Structural properties, Pressure, Failure (Mechanics), Distortion, Test method, Strain gages, Deflection, Stresses.

The capability of the forward skirt and Y-joint area when subjected to a pure compression load with the internal pressure of the pressure vessel at 400 psi is determined. Due to incapabilities of the equipment, it was necessary to run this test twice. The maximum load, when first run, was 100.7 kips with an internal pressure of 404 psi. The equipment was adjusted, and on second run the case failed under a compression load of 156.51 kips with an internal pressure of 401 psi. It was determined that the forward skirt move-

ment was very slight from the beginning of the test to the time of rupture (failure). The maximum area of expansion in the pressure vessel occurred slightly forward of the thrust termination (TT) port area. Both tangent lines expanded approximately the same amount. The over-all growth from bearing surface to bearing surface was 0.087 in. The mode of failure was buckling of the forward skirt approximately midway between the bearing surface and the tangent line area. The buckling occurred in the dog-leg area and propagated circumferentially around the skirt. (Author)

AD-412 852 Div. 26, 17
(TISTM/AMS) OTS price $3.00

Republic Aviation Corp., Farmingdale, N. Y.
IMPROVED METHODS FOR WELDING AGE HARDENABLE HIGH TEMPERATURE ALLOYS.
Final rept., 15 June 62-15 June 63,
by B. S. Blum, P. Shaw, and A. Wickesser.
June 63, 143p. Rept. no. 1425
Contract AF33 616 7670, Proj. 7351, Task 735102
ASD TDR63 601 Unclassified report

Descriptors: (*Welding, Heat resistant metals & alloys), (*Fracture (Mechanics), Welding), (*Heat resistant metals & alloys, Welding), (*Nickel alloys, Welding), Aging (Materials), Heat treatment, Cold working, Microstructure, Stresses, Sheets, Metal plates, Welding rods, Iron alloys, Tensile properties, Grain structure (Metallurgy), Hardness, Microstructure, Rupture, Metallography, Brittleness, Test equipment, Test methods, Electron microscopy.

Low melting filler wires, variations in base metal composition, and effects of prior material history were examined with respect to underbead cracking in A-286, with the latter being shown to be the controlling factor in cracking. Specimens were developed for evaluating strain age cracking propensity of different heats or different process treatments for sheet, bar, and plate material. Effects of long time-low temperature aging, preheating, welding technique, peening, localized aging, and rate of heating on strain age cracking propensity were determined. (Author)

AD-412 879 Div. 26
(TISTM/TCG) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEFECTS OF PRESS CASTINGS AND METHODS FOR THEIR PREVENTION (CHAPTER VIII),
by E. S. Stebakov and V. Ya. Tarutin.
22 July 63, 26p.
FTD TT63 713 Unclassified report

Trans. from Lit'e Vyzhimaniyem, Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury, Moskva, pp. 96-110, 1962.

Descriptors: (*Casting, Test methods), (*Material forming, Casting), Pressure, Deformation, Coatings, Thermal insulation, Thickness, Rupture, Hydrodynamics, Viscosity, Liquids, Panels (Structural).

Among the basic defects found in large area thin wall castings made by the press casting method are included the following: (1) heavy walls, (2) waviness, (3) dynamic pressure cracks, (4) blow holes, and (5) shrinkage cracks. A brief description of these defects is given below; also the basic measures for their prevention are shown. (Author)

AD-412 975 Div. 26, 9
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROHYDRAULIC METHOD OF FEEDING AND ATOMIZING LIQUID FUELS AND OTHER LIQUIDS AND DEVICE FOR ITS ACCOMPLISHMENT,
by L. A. Yutkin L. I. Gol'tsova. 3 June 63, 6p.
FTD TT63 478 Unclassified report

Trans. from Russian Patent No. 119403, (Appl. Nr. 441894/25, pp. 1-3, 20 Jan 1951.

Descriptors: (*Liquids, Atomization), (*Atomization, Liquids), (*Electric discharges, Test methods), (*Hydraulic pressure pumps, Test methods), Fuels, Feed pumps.

AD-413 659 Div. 26
(TISTM/AM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A GREAT SCIENCE MOVES EAST.
by M. A. Lavrent'yev. 12 June 63, 13p.
FTD TT63 236 Unclassified report

Trans. from Nauka i zhizn', no. 9, pp. 1-4, p. 6, 1958.

Descriptors: (*Industries, Construction). Scientific personnel.

AD-413 681 Div. 26
(TISTP/JP) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
EVALUATION OF RETROFIT APPLICATIONS OF NUMERICAL CONTROLS.
Interim technical rept.,
by Peter D. Tilton. Oct 61, 30p.
Contracts NOas60 4116c and NOw61 1063c, Projs. ISU3217 and ISU3746
Unclassified report

Descriptors: (*Machine tools, Control systems). Numerical methods and procedures, Punched tape, Cutting tools, Costs.

The technical feasibility of retrofitting existing machines with numerical controls has been further substantiated by this program. The four machines, varying widely as to design, age, and condition, were retrofitted in spite of various limitations relative to one or more of these factors. None of the technical problems encountered were insurmountable, even though the basic configuration had to be extensively altered in three of the four machines. All of these four machines have been given greatly enhanced capabilities by conversion to numerical control. All cutting motions, other machine functions, and certain auxiliary functions can now respond automatically to programmed instructions on tape or other control media. (Author)

AD-413 694 Div. 26, 25
(TISTP/FEM) OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.

Division 26 - PRODUCTION AND MANAGEMENT

Progress rept. no. 7, 1 Apr-31 May 61,
by Ulrich Rimrott. Aug 63, 1v. Rept. no.
AL61L024
Contract NObs78552
Unclassified report

Descriptors: (*Bearings, Vibration), (*Ball bearings, Elasticity), Loading (Mechanics), Harmonic oscillators, Flexible shafts, Extremely low frequency, Experimental data, Recording systems, Load distributions, Strain gages, Spectrum analyzers, Damping.

A discussion is given of the vibrations induced by the variable compliance of a radially loaded bearing and of vibrations from other sources operating at the ''ball passage'' frequency. Narrow band low frequency vibration spectra (up to 200 cps) are shown and interpreted with emphasis on discrete frequencies that can be explained by bearing kinematics. A detailed experimental investigation was conducted of the amplitudes occurring under various loads at the ball passage frequency and its second harmonic. It is shown that the results are in excess of the amplitudes predicted theoretically at these frequencies. A discussion is presented regarding the relative importance of several causes of low frequency vibration. Tests are reported on the effect of fit between bearing O.D. and housing on the vibrations observed at the housing O.D. (Author)

AD-413 830 Div. 26, 30
(TISTE/OHD) OTS price $11.50

Southwest Research Inst., San Antonio, Tex.
TECHNIQUES FOR INVESTIGATION OF FRICTION AND WEAR IN AEROSPACE BEARINGS,
by H. E. Staph, W. A. Gunkel, J. C. Harless, G. F. Munsch and R. R. Nydegger. May 63, 138p.
Contract AF33 657 8653, Proj. 8128, Task 812801
ASD TDR63 565 Unclassified report

Descriptors: (*Bearings, Instrumentation), (*Instrumentation, Roller bearings), (*Measuring devices (Electrical and electronic), Ball bearings), Friction, High-temperature research, Low temperature research, Vacuum, Rotation, Temperature, Transducers, Telemeter systems, Transformers, Measurement, Infrared equipment, Wear resistance, Scintillation counters, Electrical properties, Magnetic properties, Servo amplifiers, Servo motors, Commutators.

Instrumentation techniques were developed which may be applied toward the study of several parameters believed to contribute to friction and wear in rolling-element bearings. Measurements are made on the bearings during operations. Ultimate goal for instrumentation applicability is -65 F to 1500 F bearing temperature, 10 to the -9th power torr vacuum, and 24,000 rpm speed. The principal instrument for performing the measurements is a platform called a cage follower, which rotates in a plane alongside of and parallel to that of the bearing and in synchronism with the cage. Cage-mounted transducers for temperature and strain may be connected to the cage follower by fine wires. Transducer signals, A.C. or D.C., may be telemetered from the moving shaft through coupling transformers. The use of the cage follower to measure ball spin is described. Ball and cage temperature measurement by infrared techniques was studied and shows feasibility. Material transfer occurring during bearing operation is measured on the doubly curved bearing surfaces by preformed autoradiographs and scintillation counting. A section summarizes the literature on the effects of the presence of electric and magnetic fields on wear in rolling element bearings. (Author)

AD-413 836 Div. 26, 25
(TISTM/REG) OTS price $5.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 7, 1 Apr-31 May 61,
by Ulrich Rimrott and Olof Gustafsson.
31 May 61, 16p. AL61L024
Contract NObs78552, Proj. NE071 200; Proj. V3
Unclassified report

Descriptors: (*Ball bearings, Vibration), (*Vibration, Ball bearings), Narrowband, Harmonic analyzers, Loading (Mechanics), Harmonic analysis, Test equipment.

A discussion is given of the vibrations induced by the variable compliance of a radially loaded bearing and of vibrations from other sources operating at the ''ball passage'' frequency. Narrow band low frequency vibration spectra (up to 200 cps) are shown and interpreted with emphasis on discrete frequencies that can be explained by bearing kinematics. A detailed experimental investigation was conducted of the amplitudes occurring under various loads at the ball passage frequency and its second harmonic. It is shown that the results are in excess of the amplitudes predicted theoretically at these frequencies. A discussion is presented regarding the relative importance of several causes of low frequency vibration. Tests are reported on the effect of fit between bearing O.D. and housing on the vibrations observed at the housing O.D. Completion of the large bearing vibration tester is reported. (Author)

AD-413 837 Div. 26, 25
(TISTM/REB) OTS price $6.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 13, 1 Apr-31 May 62,
by James L. Huang. 31 May 62, 68p. AL62L023
Contract NObs78552, Proj. NE071 200; Proj. V3
Unclassified report

Descriptors: (*Ball bearings, Vibration), (*Vibration, Ball bearings), (*Roller bearings, Vibration), Shafts, Harmonic analysis, Harmonic analyzers, Capacitance, Test methods, Test equipment.

A method of measuring shaft vibrations of the large bearing vibration tester by a capacitance gage is described. Measurements of shaft vibrations are discussed. The repeatability of octave band vibration measurements of 23256 spherical roller bearings is analyzed. The relationship between bearing vibration level measured in octave bands and the rotational speed of spherical roller bearings has been studied. (Author)

AD-413 867 Div. 26
(TISTM/BRW) OTS price $8.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 15, 1 Aug-30 Sep 62,
by R. J. Finkelston, J. Huang and R. A. Hoffman.
Sep 62, 92p. AL63L004
Contract NObs78552, Proj. NE071 200
Unclassified report

Descriptors: (*Bearings, Vibration), (*Roller bearings, Vibration), Test methods, Tests, Loading (Mechanics), Analysis.

The narrow band vibration spectrum of NJ256K cylindrical roller bearing was studied. Peaks induced by roller waviness were identified experimentally. The effect of radial load and rotational speed on the vibration level of the NJ256 cylindrical roller bearings was studied. The vibration characteristics of a 23240 spherical roller bearing were studied and the results were compared with those of the 23256 spherical roller bearings tested previously. Twenty-three hundred, two hundred and fourty spherical roller bearings with improved bearing components were tested. The effect of waviness of each bearing part on the vibration level of the assembled bearing was analyzed and the relative improvements of each part are discussed with respect to the reduction achieved in the vibration level. (Author)

AD-413 881 Div. 26, 15
(TISTP/WH) OTS price $21.00

Carnegie Inst. of Tech., Graduate School of Industrial Administration, Pittsburgh, Pa.
GOAL ORIENTED MODELS FOR ACCOUNTING AND CONTROL, by Kuji Ijiri. May 63, 1v.
Contract Nonr76001, Proj. NR047011
ONR RM114 Unclassified report

Doctoral thesis.

Descriptors: (*Management engineering, Control), Linear programming, Vector analysis, Matrix algebra, Operations research, Costs, Economics, Mathematical models.

This thesis is directed toward analyzing fundamental factors in accounting for control without being restricted to the conventional monetary accounting systems, and constructing mathematical models by which planning processes and control accounting processes are tied in together for better coordination of the two processes. The classification of accounting into ''accounting for planning'' amd ''accounting for control'' is first discussed. The basic requirement of the former is to preserve maximum flexibility of data at minimum cost whereas that of the latter is to maintain uniformity and consistency of data. The thesis mainly deals with the latter, even though the outcome from the models in the thesis can, of course, be used for planning purposes as well as control purposes of management. (Author)

AD-414 085 Div. 26, 25
(TISTM/REB) OTS price $8.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 15, 1 Aug-30 Sep 62, by R. J. Finkelston, J. Huang, and R. A. Hoffman. 30 Sep 62, 90p. Rept. no. AL63L004
Contract NObs78552, Projs. NE071 200; V3
Unclassified report

Descriptors: (*Roller bearings, Vibration), (*Vibration, Roller bearings), Loading (Mechanics), Narrowband, Harmonic analysis, Harmonic analyzers, Tests.

The narrow band vibration spectrum of NJ256K cylindrical roller bearing was studied. Peaks induced by roller waviness were identified experimentally. The effect of radial load and rotational speed on the vibration level of the NJ256 cylindrical roller bearings was studied. The vibration characteristics of a 23240 spherical roller bearing were studied and the results were compared with those of the 23256 spherical roller bearings tested previously. 23240 Spherical roller bearings with improved bearing components were tested. The effect of waviness of each bearing part on the vibration level of the assembled bearing was analyzed and the relative improvements of each part are discussed with respect to the reduction achieved in the vibration level. (Author)

AD-414 086 Div. 26, 25
(TISTM/REB) OTS price $4.60

SKF Industries, Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. no. 8, 1 June-31 July 61.
31 July 61, 1v. Rept. no. AL61L031
Contract NObs78552, Projs. NR071 200; V3
Unclassified report

Descriptors: (*Ball bearings, Vibration), (*Vibration, Ball bearings), (*Roller bearings, Vibration), Harmonic analysis, Harmonic analyzers, Test equipment, Loading (Mechanics), Narrowband.

The effect of the number of rolling elements on the radial vibration spectrum expressed in octave bands is shown experimentally. Vibrations of 6305 bearings in axial direction were studied at various loads and speeds. Radial vibration spectra of 6322, 6312, 6305, and 6203 bearings were recorded for determination of outer ring resonances. Narrow band spectra were taken showing the fine structure of a 6305 and 6312 bearing vibration spectrum. The status of procurement of bearings with improved smooth running characteristics (both large roller bearings and small ''Amendment 3'' bearings) is reported. Waviness measurements on large roller bearing races are reported and a newly installed vertical Wavometer is described. Some experiences gained during trial runs of the newly installed large bearing vibration tester are reported. (Author)

AD-414 087 Div. 26, 25
(TISTM/REB) OTS price $5.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF BEARINGS.
Progress rept. nos. 9 - 10, 31 Aug-30 Nov 61, by James L. Huang. 30 Nov 61, 1v. AL61L038
Contract NObs78552, Projs. NE071 200; V3
Unclassified report

Descriptors: (*Ball bearings, Vibration), (*Vibration, Ball bearings), Broadband, Harmonic analysis, Harmonic analyzers, Test equipment, Loading (Mechanics), Vibration isolators, Damping.

The effect of waviness, measured in a broad band, on the bearing vibration is discussed. The effect of the number of balls on the radial bearing vibration, as measured in octave bands, is shown experimentally and a comparison with theory made. Tests with vibration attenuating bearing mounts are reported. Radial vibration spectra of bearings have been studied for comparison with theory presented in Special Report AL61L032. A method for evaluating the damping from the vibration spectrum of a bearing is presented. Trial runs on the vibration tester for large bearings are reported. (Author)

27. PROPULSION SYSTEMS

AD-411 791 Div. 27
(TISTA/LSK) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-121-1-7 AND QUALIFICATION SUPPLEMENT I THEREOF, CARRIAGE, ROCKET MOTOR, SECOND STAGE,
by C. E. Shaw. 7 Mar 63, 9p. D2 7230 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Test methods), Second-stage motors, Military requirements, Specifications, Environmental test, Guided missiles (Surface-to-surface), Captive tests, Handling, Test equipment, Transportation, Dollies.

This report covers the qualification testing of the Second Stage Rocket Motor Carriage. Also covered is the certification of full compliance with the qualification requirements of the qualification supplement. (Author)

AD-411 841 Div. 27, 30
(TISTA/GEC) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INVESTIGATIONS OF THRUST COMPENSATION METHODS,
by J. A. Sprouse and W. K. McGregor. Aug 63, 37p.
Contract AF40 600 1000, Proj. RK0245 and RD0206
AEDC TDR63 85 Unclassified report

Descriptors: (*Rocket motors, Thrust), (*Thrust, Determination), Captive tests, Measurement, Corrections, Analog computers, Magnetic recordering systems, Design, Test equipment, Specific impulse, Acceleration, Dynamics, Feed back.

This report deals with the problem of obtaining measurements of transient thrust when the time records are distorted by the dynamics of the stand. It is shown that analog computer techniques may be used to compute the thrust transients when an electrical signal proportional to either the displacement, the velocity, or the acceleration is available and when the constants of the system are known. However, it is also shown that an indirect analog computer method may be used when the displacement history is known; in this method the dynamics of the thrust stand are simulated and the input to the simulated system is forced to approach the actual thrust by feedback techniques. An example thrust transient problem istreated using this technique, and a small analog system for applying the method is described. It is also shown that there is no immediate advantage in increasing the natural frequency of a stand by lowering its compliance. The philosophy is developed that the emphasis in thrust stand design should be directed toward well defined dynamics at natural frequencies within practicality; then the system may be compensated to obtain true thrust transients. (Author)

AD-412 316 Div. 27
(TISTA/GEC) OTS price $9.60

Pratt and Whitney Aircraft, East Hartford, Conn.
FEASIBILITY DEMONSTRATION OF A ROTARY REGENERATOR FOR AIRCRAFT GAS TURBINES.
Final rept., 13 Feb 62-31 Jan 63,
by H. J. Selfors. 31 Jan 63, 104p. Rept. no. PWA2175
Contract NOw 62 0636
Unclassified report

Descriptors: (*Heat exchangers, Feasibility studies), (*Gas turbines, Heat exchangers), (*Turbopropeller jet engines, Heat exchanger), Airplanes, Aircraft, Design, Rotation, Heat transfer, Gas flow, Seals, Operation, Effectiveness, Pistons, Gas leaks, Configurations, Piston rings.

The feasibility study conducted was concerned with constructing and testing a toroidal rotary regenerator for aircraft gas turbine engines. The feasibility of the toroidal regenerator was demonstrated. This configuration, with additional refinements, can be developed to give a heat exchanger with the compact size, low weight, high effectiveness and low leakage which has been estimated for this unit. (Author)

AD-412 321 Div. 27
(TISTA/FRL) OTS price $2.60

United Technology Corp., Sunnyvale, Calif.
DEVELOPMENT OF NONDESTRUCTIVE TESTING TECHNIQUES LARGE SOLID-PROPELLANT ROCKET MOTORS. FEASIBILITY OF LOW-FREQUENCY ULTRASONICS FOR DETECTION OF PROPELLANT-LINER UNBONDS.
Supplement to final rept.,
by Charles Harris. 6 Aug 63, 17p. Rept. no. 2015 FR
Contract AF04 611 8018
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Nondestructive testings), (*Nondestructive testing, Rocket motors (Solid propellant), Test methods, Tests, Ultrasonic properties, Combustibn chamber liners, Separation, Rocket propellant grains, Failures (Mechanics), Rocket cases, Transducers, Instrumentation, Bonding.

Ultrasonic techniques for detecting propellant-liner unbonds are reported. A detailed description of the ultrasonic equipment is given. The work was carried out using the 120-inch diameter segment containing known defects which was manufactured under this contract. (Author)

AD-412 443 Div. 27, 1
(TISTA/FRL) OTS price $4.60

Pratt and Whitney Aircraft, East Hartford, Conn.
FEASIBILITY DEMONSTRATION OF A ROTARY REGENERATOR FOR AIRCRAFT GAS TURBINES,
by H. J. Selfors. 1963, 43p. Suppl. A to rept. no. 2175
Contract NOw62 0636f
Unclassified report

Descriptors: (*Gas turbines, Airplane engines), Helicopter engines, Heat exchangers, Feasibility studies, Rotation, Configuration, Pressure, Tests, Carbon, Rings, Seals (Stoppers).

The feasibility of a rotary regenerator for an aircraft gas turbine is reported. Testing demonstrated an improvement in regenerator performance with the result that effectiveness goals have been realized. In addition, component rig tests of seals have shown that the leakage goals can be reached with minor modification of the ring seal liner support. (Author)

AD-412 455 Div. 27, 14
(TISTM/EJH) OTS price $5.60

Atlantic Research Corp., Alexandria, Va.
CHEMICAL REACTIONS BETWEEN PROPELLANT GASES AND NOZZLE MATERIALS.
Final rept., 1 July 62-1 July 63.
July 63, 51p.
Contract NOrd15536
Unclassified report

Descriptors: (*Rocket motor nozzles, Erosion), (*Refractory materials, Erosion), (*Exhaust gases, Erosion), (*Erosion, Rocket motor nozzles), Chemical reactions, Graphite, Carbides, Tantalum compounds, Niobium compounds, Water, Carbon dioxide, Monoxides, Carbon compounds, Chlorides, Fluorides, Hydrogen compounds, Nitrogen, Argon, Boron compounds, High temperature research, High pressure research, Pyrolytic graphite.

To improve our understanding of the role of chemical reactions in the erosion of rocket nozzle materials, a laboratory study of probable reactions was carried out with graphite and refractory metal carbides. Hemispherical specimens of AGOT, ZTA, and pyrolytic graphite were exposed to hot gas streams containing N, Ar, CO, CO2, H2O(g), and HC1(g) generated by a plasma torch. Erosion rates were measured over a range of temperatures from 2000 to 3000 K. Significant losses were observed with each of the gases. Oxidation by CO2 and H2O(g) was by far the most destructive effect. It was concluded that thermo-mechanical effects as well as chemical reactions were important factors in the erosion of graphite. Wire specimens of dense tantalum carbide and niobium carbide were developed. The specimens were used as electrically heated filaments and exposed to CO2, CO, H2O(g), H2, HC1(g), BF3(g), and HF(g) under a variety of static test conditions. TaC was rapidly oxidized by CO2 and H2O(g). Limited exposure studies were completed with NbC, but the deleterious effect of CO on this carbide raises serious question concerning its suitability for rocket nozzle service. (Author)

AD-412 682 Div. 27
(TISTA/LSK) OTS price $8.10

Rocketdyne, Canoga Park, Calif.
DESIGN INFORMATION REPORT FOR THE LV-2A PROPULSION SYSTEM (YLR79-NA-13 MAIN ENGINE AND LR101-NA-11 VERNIER ENGINES).
30 July 63, 79p. Rept. no. R5214
Contract AF04 695 306
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Handbooks), Vernier rocket motors, Sustainer motors, Installation, Design, Performance (Engineering), Launch vehicles (Aerospace), Guided missiles (Surface to surface), Movable rocket motors.

This report consists of: (1) a description of the LV-2A propulsion system, comprising the YLR79-NA-13 main engine and the LR101-NA-11 vernier engines, (2) installation and geometry information, and (3) performance data. (Author)

AD-412 805 Div. 27, 14
(TISTM/TCG) OTS price $6.60

IIT Research Inst., Chicago, Ill.
THEORETICAL AND EXPERIMENTAL STUDY OF VARIOUS DIFFUSION PUMP OILS.
Final rept., 27 June 62-26 Mar 63,
by W. M. Langdon. Aug 63, 58p. Rept. no. 3228 9
Contract AF40 600 1004, Proj. C228
AEDC TDR63 174 Unclassified report

Descriptors: (*Oils, Diffusion pumps), (*Diffusion pumps, Oils), Seals (Stoppers), Instrumentation, Surfaces, Protective treatment, Organic solvents, Cleaning, Pressure gages, Chemical analysis, Ultraviolet spectroscopy, Vaporization, Processing, Boiling, Chromatographic analysis, Pumps, Specifications, Theory, Spacecraft.

DC 704, DC 705, and Convalex 10 diffusion pump oils were studied in baffled systems operating at 10 to the -7th power to 10 to the -9th power torr for periods up to 5 mos. The pumping stations, with fail-safe instrumentation, used 6-inch fractionating pumps with water-cooled caps, and cooled optically tight baffles of either chevron traps or right-angle elbows. A sensitive analytical procedure involving ultraviolet absorption spectra was developed to measure the quantity of oil deposited. The amount of backstreaming oil with both baffles and collection plate cooled with 5 C water varied from 1 x 10 to the -6th power to 10 to the -8th power mg/(sq cm) (min) as follows: DC 704 (chevron) > DC 705 (chevron) > Convalex 10 (chevron) > DC 705 (elbow) > Convalex 10 (elbow). One-fifth as much backstreaming was obtained with Convalex 10 compared with DC 705 under comparable conditions and also one-fifth as much with the elbow baffle compared with the chevron baffle. While the exact mechanism of backstreaming was not determined, backstreaming undoubtedly is primarily a function of the eruptive boiling characteristics of the vaporizing process. (Author)

AD-412 815 Div. 27
(TISTA/LSK) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
DEVELOPMENT OF THE 24-INCH PACKRAT BOOSTER MOTOR,
by James Mills. May 63, 36p.
NavWeps 7811; NOTS TP 2810
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Captive tests), (*Thrust vector control systems, Controllable-thrust rocket motors), Nozzle clusters, Containers, Booster motors.

Two storable liquid-propelled rocket motors of 24-in. diameter were designed, built, and statically tested at the U. S. Naval Ordnance Test Station. Packrat I was rated at 5,000 pounds thrust and Packrat II at 20,000 pounds thrust. Both were designed to deliver 522,720 pound-seconds of impulse. Packrat II incorporated a unique method of thrust-vector control, using four fixed-position variable-thrust motors to provide pitch, yaw, and roll control. Neither round produced the design impulse, but the design and system feasibility have been proved, and only minor modification would be needed to meet the designed performance. (Author)

AD-413 090 Div. 27
(TISTA/LSK) OTS price $8.60

Rocketdyne, Canoga Park, Calif.
RESULTS OF ATLAS MA-3 VIBRATION TEST PROGRAM.
22 July 63, 91p. Rept. no. R5267
Contract AF04 694 328
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Vibration), Test methods, Tests, Booster motors, Sustainer motors, Fuel systems, Shock resistance, Environmental tests, Guided missiles (Surface-to-surface), Turbines, Turbopumps.

Presented is a summary of the design criteria and test program conducted by Rocketdyne for the vibration testing of two Atlas MA-3 rocket engines. The primary purpose of these tests was to determine whether any marginal design conditions exist for fluid lines and their supports. (Author)

AD-413 299 Div. 27
(TISTA/GEC) OTS price $5.60

Aerojet-General Corp., Sacramento, Calif.
DEVELOPMENT OF PERISCOPE FOR THRUST CHAMBER COMBUSTION ANALYSIS. VOLUME 6.
Final rept.,
by J. D. O'Donnell. 28 May 63, 1v. Rept. no. 652 SA4 2 2 F 1, vol. 6
Contract AF04 647 652/SA4
BSD TDR63 123 Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Combustion chambers), (*Combustion chambers, Periscopes), (*Periscopes, Design), Optical equipment, Quartz, Lenses, Pressure, Environmental tests, Mechanical drawings, Temperature, Fuel injectors, Combustion, Stability, Instrumentation.

Development was continued of a periscope to permit visual study of high-frequency instability and other phenomena of the combustion process in full-scale thrust chambers. Emphasis was placed on developing a reliable device to protect the optical system from the heat, erosion, and pressure of combustion, and designing a versatile optical system with a high resolution and wide field of view. The optical system, called a periscopes, will be capable of being used for high-speed color photography of the combustion process. A quartz dome capable of withstanding exposure to combustion gases at 850 psi chamber pressure was developed. (Author)

AD-413 509 Div. 27
(TISTM/TCG) OTS price $2.60

International Research and Development Co., Ltd. (Gt. Brit.).
DENSITY-TIME PROFILES FOR AN ELECTRIC PROPULSION UNIT EFFLUX.
Research rept.,
by I. R. McNab and P. C. McNeill. 1963, 21p.
Unclassified report

Descriptors: (*Electric propulsion, Ionization), (*Ion beams, Density), Diffusion, Ions, Particles, Atmosphere, Differential equation, Recombination reaction, Exhaust gases, Ion engines, Molecular beams, Spacecraft.

The initial particle densities obtained from present electrical propulsion units indicate that, at altitudes between 50 and 200 miles, the decay of density in the efflux may be obtained using a diffusion approach, numerical density-time profiles are given. When initial particle densities are less than 10 to the 12th power ions/cc the effects of recombination and ionisation are shown to be negligible, the efflux remaining fully ionised. The results are compared with those obtained by Molmud for free molecular flow and the difference between the two approaches is explained. The effects of such highly ionised exhausts on radio communications between space vehicles and ground stations are discussed. (Author)

AD-413 530 Div. 27, 6, 9
(TISTA/GEC) OTS price $3.60

General Dynamics/Astronautics, San Diego, Calif.
SCALING OF ROCKET MOTOR EXHAUST OPTICAL RADIATION. PART II: A STUDY OF COLLISION-INDUCED VIBRATIONAL TRANSITIONS IN MOLECULES.
Semiannual rept.,
by R. Marriott. Jan 63, 34p.
Contract AF04 695 140
SSD TDR63 187, pt. 2 Unclassified report

Descriptors: (*Rocket motors, Exhaust gases), (*Exhaust gases, Infrared radiation), Molecules, Energy, Mathematical analysis, Chemical reactions, Gas flow, Vibration.

Methods for theoretical determination of cross-sections for energy exchange in collision of molecular species present in rocket exhaust jets and the atmosphere are described. Preliminary results are presented which both confirm the usefulness of the method and point out the difficulties of selection of appropriate forms for the intermolecular potential functions. (Author)

AD-413 578 Div. 27, 26
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATING ANTI-FRICTION QUALITIES OF PLASTICS UNDER WORKING CONDITIONS OF BEARINGS OF SHIP PROPELLER SHAFTS,
by V. A. Buzkov. 24 May 62, 5p.
FTD TT63 263 Unclassified report

Trans from Dopovidi Akademiy Nauk Ukraynskoy RSR, No. 7, pp. 901-905, 1962.

Descriptors: (*Plastics, Bearings), (*Bearings, Plastics), Wear resistance, Friction, Surface properties, Microstructure, Anti-friction bearings, Propellers (Marine), Shafts, Tests, Creep, Aging (Materials), Polymers; Polyethylene plastics, Stainless steel, Graphite, Chromium alloys, Cadmium alloys, Hardness.

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-411 869 Div. 28
(TISTB/WA) OTS price $2.00

Arizona U., Tucson.
STUDY AND RESEARCH ON ELECTRONIC SIMULATION OF THE BIOLOGICAL CLOCK II.
Final rept.,
by Andrew P. Sage, Jr., Keith E. Justice, and James L. Melsa. May 63, 66p.
Contract AF33 616 7677, Proj. 4160, Task 416001
ASD TDR63 136 Unclassified report

Descriptors: (*Bionics, Photoperiodism), Environmental tests, Simulation, Mathematical model, Theory, Light, Rats, Reaction (Psychology), Photosensitivity (Biological), Mathematical analysis.

The term 'biological clock' has been given to

the phenomenon displayed by organisms, both plants and animals, that pace their functions in a cyclic fashion that is related in some way to environmental stimuli. This report includes: (1) design and construction of an experimental facility to compare specific data from the electronic model with animals subjected to the same environmental conditions simulated on the model, (2) biological experimentation and statistical analysis of the biological results to test validity of the biological clock and suggest improvements for the mathematical and electronic model, (3) cellular analysis of some functional aspects of the c(t) generation in order to initiate establishment of a one to one correspondence with the model of the biological clock, (4) investigation of adaptive and learning system capabilities of the biological clock, and (5) development of a better model for the biological clock and possible engineering system implications. (Author)

AD-412 561 Div. 28, 16
(TISTB/MS) OTS price $1.60

RAND Corp., Santa Monica, Calif.
SHORT-TERM EFFECTS OF LSD ON ANXIETY, ATTITUDES, AND PERFORMANCE,
by William H. McGlothlin, Sidney Cohen, and Marcella S. McGlothlin. June 63, 15p. Rept. no. P2757

Unclassified report

Descriptors: (*Chemotherapeutic agents, Effectiveness), (*Performance (Human)), (*Anxiety), (*Attitudes), Psychometrics, Psychology, Pharmacology.

This study describes the short-term effects of administering LSD to normals as measured by pre- and one-week-post-LSD tests of anxiety, attitudes, and performance. The hypothesis tested was that LSD would produce a rapid lowering of defenses resulting in (1) lower anxiety, (2) attitudinal changes, particularly in the form of decreased dogmatism and projection of aggression, and (3) increases in certain performance tests of fluency, flexibility, and originality. The samples consisted of 15 experimental and 14 comparison subjects, most of whom were professional research personnel. The hypothesis was generally confirmed for the anxiety and attitude tests, but there were no gains in the performance tests beyond that attributable to practice effect as measured in the comparison group. An attempt was made to determine if certain LSD-induced changes in the word-association test results, as found in a previous study, were retained in the post-LSD period. The results were inconclusive, apparently because of the lack of similarity between the samples of subjects. A larger study is planned using a six-month follow-up period. (Author)

AD-412 657 Div. 28, 23, 32
(TISTB/MS) OTS price $9.60

Human Resources Research Office, George Washington U., Washington, D. C.
HUMAN FACTORS IN CIVIC ACTION. A SELECTED ANNOTATED BIBLIOGRAPHY,
by Robert J. Foster. June 63, 91p.
Contract DA44 188AR02

Unclassified report

Descriptors: (*Psychology, Bibliographies), (*Social sciences, Bibliographies), (*Bibliographies, Social sciences), (*Bibliographies, Psychology), (*Culture, Bibliographies), Economics, Personality.

This bibliography is designed to aid in educating and training United States personnel who will assist the military personnel of developing nations to play an active role in the socioeconomic advancement of their countries. It should also be of interest to personnel of agencies that are concerned with providing technical assistance to the developing nations. The chief goal of the compilation is to provide a selected list of items which a busy officer could reasonably expect to read in entirely within a few weeks before going overseas. Priority has been given to items that are nontechnical and thought-provoking, have relevance to most underdeveloped areas, are of article rather than book length, and emphasize the problems of working across cultural barriers. Basic divisions of the bibliography are: Philosophy of Civic Action and Foreign Aid, The Nature of Underdeveloped Countries, The Techniques of Planned Change, and Individual Effectiveness.

AD-412 776 Div. 28, 23
(TISTB/MS) OTS price $1.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PERFORMANCE TESTING: TESTING FOR WHAT IS REAL,
by John P. Foley. June 63, 13p.
AMRL MN P42

Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Achievement tests, Effectiveness), (*Performance (Human), (*Performance tests, Effectiveness).

It is generally conceded that performance examinations are superior to written examinations for the measurement of job behaviors required of Air Force specialists and technicians. However, performance examinations, both in school and on-the-job, are time consuming in their development and in their administration. Written examinations have, therefore, been substituted in many cases for performance examinations. This memorandum presents the difficulties involved in developing and administering performance examinations, the dangers of depending on written examinations as substitutes for performance examinations, and the fact that there is a lact of research information on the valid substitution of written for performance examinations. It proposes developmental research with a view of simplifying performance examination procedures and establishing valid guide lines as to the scope of written examinations in measuring job behaviors. It, also, makes some recommendations concerning immediate action that can be taken to improve the validity of current technical training examination procedures. (Author)

AD-412 826 Div. 28
(TISTB/MS) OTS price $1.60

California U., Los Angeles.
THE TRAINING OF ORIGINAL PROBLEM SOLVING BEHAVIOR.
Final rept.
July 63, 11p.
Contract Nonr233 50

Unclassified report

Descriptors: (*Training, Behavior), Reasoning, Reaction (Psychology), Learning, Behavior, Performance (Human).

Thinking appears to be endlessly complex because we do not know all of the initial conditions present when an individual begins to think. The most important of these initial conditions is the probabilities of occurrence or response strengths of his available responses. Labels such as categories of thinking, strategies, reasoning, etc. do not represent principles of thinking. They represent the products of thinking and are therefore misleading in their emphasis. Fully adequate explanations of thinking under different stimulus conditions will never be possible until the history of learning of the individual is known, until reaction tendencies of the relevant responses in a situation can be assessed through a knowledge of the number of occasions that they have occurred in the past. In the absence of such knowledge we do not know precisely what is happening when we administer so-called originality training. A technology that is not based upon a knowledge of the basic behavioral principles cannot hope to be widely generalizable or successful. Nevertheless, the experimental procedures that we have employed in experimental studies of originality, as well as the techniwues of others, could be employed in simple minded ways in more complex situations and may well prove effective in the facilitation of originality. (Author)

AD-412 867 Div. 28
(TISTB/MS) OTS price $3.60

Duke U., Durham, N. C.
SOME PERSONAL AND SITUATIONAL FACTORS RELEVANT TO THE CONSISTENCY AND PREDICTION OF CONFORMING BEHAVIOR,
by Kurt W. Back and Keith E. Davis. Aug 61, 14p. Technical rept. no. 11
Contract Nonr118111, Proj. NR177470
Unclassified report

Descriptors: (*Behavior, Group dynamics), (*Group dynamics, Sociometrics), Personality.

The consistency of individual conformity to group pressure was investigated in three quite different situations - a perceptual judgment task, self-reported acceptance of peer group norms, and self-reported acceptance of authoritative conformity pressures. There was a small but consistent trend for persons who conformed in one situation to conform in the other two. Elaine G. Sofer's scale of Inner vs. Other-directedness was highly related to conformity in two of the three situations. A measure of acquiescent (or yea-saying-naysaying) responding was unrelated to any of the conformity measures; but a measure of socially desirable responding predicted to judgmental yielding when the experimental group contained at least one 'close friend.' Status in the peer group was negatively related to conformity when a competence criterion was employed but not when a popularity criterion was used. (Author)

AD-413 040 Div. 28
(TISTB/MS) OTS price $2.60

California U., Los Angeles.
ASSOCIATIVE BEHAVIOR IN NORMAL AND SCHIZOPHRENIC CHILDREN. THE TRAINING OF ORIGINAL PROBLEM SOLVING BEHAVIOR,
by Irving Maltzman, Samuel Cohen and Marigold Belloni. July 63, 15p. Technical rept. no. 11
Contract Nonr23350
Unclassified report

Descriptors: (*Verbal behavior, Children), Psychoses, Reaction (Psychology), Theory.

Normal and schizophrenic children associated to high and low commonality stimulus word lists. Half the Ss within each group received repeated presentations of the first list with instructions to give a different association each time. For each presentation, scoring the associations from norms derived from one group resulted in that group showing a higher response commonality than the other. The groups did not differ significantly in the uncommonness of their associations when combined norms were employed. Response commonality among the schizophrenics was primarily the result of their repetition of the stimulus word. It was concluded that these schizophrenic children did not manifest more original associations than normal children, and that their divergent verbal behavior was a consequence of deficient orienting responses rather than extreme levels of anxiety. (Author)

AD-413 306 Div. 28
(TISTB/MS) OTS price $4.60

California U., Los Angeles.
EXPERIMENTAL STUDIES OF ASSOCIATIVE VARIABLES IN ORIGINALITY,
by Irving Maltzman, Marigold Belloni, and Martin Fishbein. July 63, 36p. Technical rept. no. 10
Contract Nonr23350
Unclassified report

Report on The Training of Original Problem Solving Behavior.

Descriptors: (*Verbal behavior, Reasoning), (*Reaction (Psychology), Learning, Theory, Training, Analysis of variance.

A series of experiments was conducted to study associative variables that may facilitate problem solving performance on problems having a specific correct solution. Several experiments were conducted with a group form of the two-spring problem. It was found that prior verbal learning of relevant response sequences failed to affect problem solving performance in the predicted manner. A more extensive series of experiments was conducted employing the Remote Associates Test (RAT) of originality. Facilitation of solutions to the items was found to vary with the extent to which prompting stimuli were associated with the problem solutions. Manipulation of associative variables reliably influenced performance on the RAT. Problem solving performance on the RAT, in contrast, was relatively resistant to changes in ''extrinsic'' variables. (Author)

AD-413 348 Div. 28
(TISTB/MS) OTS price $1.60

Educational Testing Service, Princeton, N. J.
AN EXPERIMENTAL ANALYSIS OF A TACTICAL BLUNDER,
by Albert E. Myers. June 63, 14p. Research bulletin no. 63 18
Contract Nonr295900
Unclassified report

Descriptors: (*Behavior, Errors), Decision making, Perception, Game theory, Mathematical models, Reasoning.

An experiment was conducted in which college Ss played a ''Path and Obstacles'' game. Their task was to trace a path on a 5x5 plugboard in such a way as to avoid hitting any of the obstacles

placed by the other player. The placement of the obstacles was always controlled by the experimenter. Half the Ss faced obstacle arrangements which always left a certain path open. The trial to trial movement of the obstacles in this condition was fundamentally random. The other Ss faced obstacle arrangements in which the trial to trial movement of obstacles was systematic (there was no randomness). Here, the S could not be successful by repeating the same path. These conditions were labeled, accordingly, the Fixed and Variable Path solutions. It was possible to isolate a class of moves by the Ss which could be rigorously defined and which were, in every instance, inappropriate. It was found that the Ss in the Fixed Path condition made significantly more of these poor moves. That is, Ss who were in a milieu which was characterized by a high degree of order (Variable Path condition) made fewer mistakes even though they did not know what the principle of order was. (Author)

AD-413 361 Div. 28
(TISTB/MS) OTS price $6.60

Washington U., St. Louis, Mo.
AFFECTIVE AROUSAL TO MUSIC AS A FUNCTION OF DEVIATIONS IN PERCEIVED COMPLEXITY FROM AN ADAPTATION LEVEL,
by Carl E. Pitts and Richard deCharms. 27 June 63, 64p. Technical rept. no. 19
Contract Nonr81611, Proj. NR170 424
Unclassified report

Descriptors: (*Perception, Stimulation), (*Motivation, Inhibition), (*Reaction (Psychology)), (*Adjustment (Psychology)), (*Stimulation, Reduction), (*Adaptation (Physiology)), Theory, Emotions, Music.

This study consisted of six investigations, four of which were necessary to develop original musical stimulus items which varied as nearly as possible on a simplicity-complexity dimension. The last two studies constituted tests of the above theoretical statement by; (1) exposing Ss to the musical selections and having them evaluate the items for both complexity and affect and, (2) by attempting to move the adaptation level through frequent exposure of one of the items. The first of the two testing studies was made up of three sessions; session one consisted of a paired comparison measure for perception of complexity; session two of two affect measures (paired comparison and five point Likert-type scale); and the third session of a pre-test affect measure, repetition of the most-liked selection twenty-one times, and a post-test affect measure. The findings were that with minor exceptions, the hypothesized model of positive affect for minor deviations and negative affect for major deviations from adaptation level was upheld. These data tend to support McClelland's theory of the affective arousal model. (Author)

AD-413 400 Div. 28
(TISTB/MS) OTS price $2.60

Colorado U., Boulder.
CONCEPTUAL DETERMINANTS OF INFLUENCIBILITY,
by O. J. Harvey. June 63, 27p. Technical rept. no. 5
Contract Nonr114707
Unclassified report

Descriptors: (*Personality, Analysis), Attitudes, Theory, Reaction (Psychology).

Individuals varying in conceptual makeup were subjected to a series of experimental manipulations calculated to elicit different responses from the varyingly constituted participants. More specifically, representatives of the four nodal conceptual systems posited by Harvey, Hunt and Schroder (1961) were exposed to experimental variations that were expected to ''pull'' differential yielding to or reliance upon external cues and social influence. According to the theory of Harvey, et al., representatives of these four conceptual systems vary not only in terms of concreteness-abstractness, as a function of the developmental stage they have attained, but they also vary in terms of the cues or guidelines on which they tend to rely in cognizing and reacting to given classes of stimulus events or situations. (Author)

AD-413 589 Div. 28
(TISTB/MS) OTS price $2.60

Colorado U., Boulder.
SOME COGNITIVE CORRELATES OF MORE ENDURING OPINION CHANGE,
by O. J. Harvey. July 63, 19p. TR 4
Contract Nonr114707
Unclassified report

Descriptors: (*Public opinion), (*Attitudes), (*Reasoning).

Ten representatives of each of the four major conceptual systems or levels of abstractness posited by Harvey, et al. (1961) were required to argue in opposition to their own belief concerning whether or not philosophy should be required as a minor for all college undergraduates. There were neither main effects nor interactional effects of the public-private and concreteness-abstractness variations in the amount of opinion change immediately following role playing. There were significant differences between the more concrete and the more abstract Ss in the amount of change per item of stimulation. Also both the public-private and concreteness-abstractness variations, as well as their interaction, affected significantly the extent to which initial change was maintained one week later. The more concrete Ss maintained their opinion change significantly more than did the more abstract Ss; change occurring under the public condition was maintained to a significantly greater extent than that occurring in private; and the difference between the public and private conditions was significantly greater for the more concrete than the more abstract Ss. (Author)

AD-413 719 Div. 28, 16
(TISTB/MS) OTS price $2.60

Duke U., Durham, N. C.
PLASMA LIPID RESPONSES TO LEADERSHIP, CONFORMITY AND DEVIATION,
by Kurt W. Back and Morton D. Bogdonoff. 1963, 1v. Technical rept. no. 10
Contract Nonr1181 81, Proj. NR177 470
Unclassified report

Descriptors: (*Leadership, Fatty acids), (*Fatty acids, Leadership), (*Group dynamics, Stress (Psychology)), Lipids.

Plasma free fatty acids (FFA) have been shown to be sensitive indicators of central and autonomic nervous system arousal as well as causative agents in atherosclerosis. Their measurement gives a possibility of assessing the meaning of

variables introduced in social psychological experiments and compare them with epidemiological evidence of the action of the same variables, namely pressure to conformity and responsibility of leadership. Four experiments, using a standard technique of producing experimental conformity, are described. (Author)

AD-413 720 Div. 28
(TISTB/MS) OTS price $3.60

Duke U., Durham, N. C.
SOME PERSONAL AND SITUATIONAL FACTORS RELEVANT TO THE CONSISTENCY AND PREDICTION OF CONFORMING BEHAVIOR,
by Kurt W. Back and Keith E. Davis. 1963, 1v.
Technical rept. no. 11
Contract Nonr1181 11, Proj. NR177 470
Unclassified report

Presented at the annual meeting of the American Sociological Association, August, 1961.

Descriptors: (*Group dynamics, Psychometrics), (*Adjustment (Psychology), Group dynamics), (*Perception, Stress (Psychology)).

The consistency of individual conformity to group pressure was investigated in three quite different situations--a perceptual judgment task, self-reported acceptance of peer group norms, and self-reported acceptance of authoritative conformity pressures. There was a small but consistent trend for persons who conformed in one situation to conform in the other two. Elaine G. Sofer's scale of Inner vs. Other-directedness was highly related to conformity in two of the three situations. A measure of acquiescent (or yeasaying-naysaying) responding was unrelated to any of the conformity measures; but a measure of socially desirable responding predicted to judgmental yielding when the experimental group contained at least one ''close friend.'' Status in the peer group was negatively related to conformity when a competence criterion was employed but not when a popularity criterion was used. (Author)

AD-413 748 Div. 28
(TISTB/AAR) OTS price $1.10

Instituto de Neurologia, Montevideo (Uruguay).
ATTENTION, HABITUATION, AND CONDITIONING AS RELATED TO EVOKED BRAIN WAVES.
Final technical rept.
1962, 9p.
Grant AF AFOSR62 331; AF AFOSR312 63
AFOSR Rept. no. 4956 Unclassified report

Descriptors: (*Conditioned reflex, Man), Brain, Laboratory animals, Electroencephalography, Stimulation, Attention, Vision, Reflexes.

AD-413 913 Div. 28
(TISTB/WA) OTS price $3.60

Educational Testing Service, Princeton, N. J.
A MATHEMATICAL ANALYSIS OF THE IMPACT OF THE SOURCE AND CONTENT ON THE EVALUATION OF A MESSAGE,
by Harold Schiffman. June 63, 29p. Rept. no. RB63 17
Contract Nonr185815, Proj. NR150 088
Unclassified report

Project on Mathematical Techniques in Psychology.

Descriptors: (*Communication systems, Mathematical analysis), Theory, Psychology, Mathematical models.

This thesis proposes a mathematical model which postulates a precise relationship between message and sender. The experiment was designed so that the experimenter could note variations in the evaluations of identical statements as they were perceived to have been emitted by various sources. To test the appropriateness of the model, the statements were chosen by the experimenter and the sources selected by the subjects in a way that a two-dimensional structure--a competence dimension and a like dimension--should appear from the analysis. From the analysis of the pooled data, two distinct but highly correlated dimensions appeared. These dimensions could be clearly identified as a ''like'' dimension and a ''competence'' dimension. Statements and sources relevant to competence clustered around the competence dimension; statements and sources relevant to liking clustered around the dimension identified as the like dimension. This analysis accounted for nearly 99 percent of the variance. (Author)

AD-413 965 Div. 28
(TISTB/WA) OTS price $1.10

Delaware U., Newark.
THE EFFECTS OF CHANGES IN GROUP COMPOSITION ON GROUP PERFORMANCE.
Final rept.
1963, 7p.
Grant AFOSR 62 95
AFOSR 4947 Unclassified report

Descriptors: (*Group dynamics, Psychology), Performance tests, Job analysis, Reaction (Psychology), Behavior.

AD-413 973 Div. 28
(TISTB/WA) OTS price $1.60

Stanford U., Calif.
A COMPARISON OF THE RESULTS OBTAINED FROM VARIOUS MEASURES OF LEADERSHIP BEHAVIOR,
by George H. Rice, Jr. and Lucy E. Burnham.
25 July 63, 15p. Technical rept. no. 3
Contract Nonr225 62
Unclassified report

Descriptors: (*Leadership, Behavior), Group dynamics, Sociometrics, Job analysis, Personality, Psychometrics, Psychology, Statistical analysis.

Thirty-four leaderless, ad hoc groups were observed while discussing a human relations problem. The behavior of group members was coded along three dimensions, with a fourth dimension resulting from a summation of these three categories. At the end of discussion periods, group members individually completed a sociometric questionnaire. The observations and questionnaires resulted in a total of seven measures of leadership activity for each group. These measures have been termed criteria, and have been used to rank participants on each of the leadership dimensions. The purpose of this paper has been to examine the intercorrelation of the criteria. These results show significant correlations between all criteria. Intercorrelations within the questionnaire instrument are greater than within the observation-coding instrument. Correlations between Total Behavior and the criteria obtained from the questionnaire are generally higher than between any one of the observation-coding criteria and the questionnaire criteria. (Author)

AD-413 999 Div. 28
(TISTB/WA) OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
ROTARY PURSUIT TRACKING WITH DIVIDED ATTENTION TO CUTANEOUS, VISUAL, AND AUDITORY SIGNALS,
by Sam Glucksberg. Mar 63, 13p.
HEL TM5 63 Unclassified report

Descriptors: (*Stimulation, Tracking), (*Psychomotor tests), Signals, Visual signals, Skin, Sound signals, Job analysis, Performance tests, Reaction (Psychology), Perception, Analysis of variance.

Cutaneous communication has been suggested for use in several types of military tasks. This investigation was designed to compare the disruptive effects of visual, auditory, and cutaneous (electrical) stimulation upon pursuit rotor tracking performance. Subjects were required to respond to a specified signal (light, sound, or electric current) while engaged in tracking. Only one modality was employed at any one time. Three distractive signal detection tasks were used: (1) simple reaction time (RT), (2) disjunctive RT requiring a spatial discrimination, and (3) disjunctive RT requiring an intensity discrimination. In all three cases attention to visual signals significantly impaired tracking accuracy. Neither auditory nor cutaneous stimulation disrupted tracking performance. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-412 379 Div. 29, 4
(TISTM/TCG) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
CAKING IN STORAGE OF ALKALINE CLEANING COMPOUND,
by A. Mankowich. 31 May 63, 16p.
Proj. 1 H O 24401 A 110 05
APG Rept. no. CCL 144 Unclassified report

Descriptors: (*Cleaning compounds, Alkali metal compounds), (*Alkali metal compounds, Cleaning compounds), (*Storage, Cleaning compounds), Sodium compounds, Silicates, Phosphates, Nitrates, Hydrates, Mixtures, Polyethylene plastics, Fibers (Synthetic), Containers, Steam cleaning.

A large scale, 12 months study was made of caking in storage of a representative powdered alkaline cleaner, the standard comparison compound of Federal Specification P-C-437, Cleaning Compound, High Pressure (Steam) Cleaner. The study, involving the production of 6 1/2 tons of the compound and its loading into 104 polyethylene-lined fiber drums (125 pounds per drum), covered the parameters of order of mixing, granulation, and transportation. The parameter of anhydrous vs hydrated salts was the subject of a preliminary study and found not to be a factor in caking. Five granulation grades were investigated ranging from a 10 - 20 grade (84% 10 - 20 mesh) to a ''fines'' grade (85% passing 100 mesh, and 40% passing 270 mesh). Three orders of mixing were used, and half the production (52 drums, consisted of various parameter changes) was transported 1,000 miles by commercial carrier. Only the fines grade granulation mixes caked, in all orders of mixing and with or without transportation. Normal transportation (1,000 miles) does not induce caking by vibratory packing. A granulation grade whose ingredients originally consisted of approximately equal amounts of fines and coarse particles did not cake in 12 months storage, but considerable agglomeration occurred; almost all of the original 46% cut passing 100 mesh was retained on that screen after the 12 months storage. (Author)

AD-412 781 Div. 29
(TISTB/WA) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ACCUMULATION OF STATIC ELECTRICITY ON ARCTIC CLOTHING,
by James H. Veghte and Walter W. Millard.
May 63, 11p.
Proj. 8238, Task 823801
AAL TDR63 12 Unclassified report

Descriptors: (*Static electricity, Clothing), (*Clothing, Static electricity), Polar regions, Cold weather tests, Electrostatics, Hazards, Capacitance.

Electrostatic voltages and capacitance on active men wearing various arctic clothing assemblies were measured at temperatures ranging from +5 to -43 C. Although there is an increase of electrostatic charges on arctic clothing assemblies with a decrease in ambient temperature, the stored energy calculations indicate there is no danger of igniting explosive gas-air mixtures due to a discharge of the electrostatic charges under normal conditions. A hazard may exist, however, if a person rapidly removes his outer jacket while working outside in a hazardous gas-air mixture. Also, a definite buildup of electrostatic charges above the critical threshold for igniting a concentrated gas-air mixture by an electrostatic discharge exists when a person working out-of-doors comes in and removes his parka or wool shirt without first properly grounding himself. (Author)

AD-413 789 Div. 29, 28
(TISTB/MS) OTS price $2.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
SOLDIERS' ATTITUDES TOWARD FOODS IN A TROPICAL ENVIRONMENT. PART 1. THE NATURE OF THE TROPICAL ENVIRONMENT AND SOLDIERS' REACTIONS TOWARD OPERATIONAL RATIONS.
Interim rept.,
by John L. McCoy. July 63, 24p.
QFCIAF AMXFC 3 63 Unclassified report

Report on Human Factors in QMC Operations 7X95-01-001.

Descriptors: (*Military rations, Attitudes), (*Tropical regions), (*Food, Acceptability).

A study of factors affecting soldiers' acceptance of QMC materiel, particularly of foods, in tropical environments has Primary Field: Product Acceptance Secondary Field(s): Tropics; Attitudes been initiated. This report describes the general environmental setting for the research and soldiers' reactions toward certain operational ration components. (Author)

AD-413 797 Div. 29
(TISTB/AAR) OTS price $3.60

Quartermaster Research and Engineering Command, Natick, Mass.
BIBLIOGRAPHY OF PUBLICATIONS AND TECHNICAL PAPERS FOR 1962.
May 63, 37p.
QREC QMRE27 Unclassified report

Descriptors: (*Armed forces supplies, Bibliographies), (*Bibliographies, Armed forces supplies), Logistics, Food, Scientific research, Engineering, Reports.

AD-413 933 Div. 29
(TISTB/AAR) OTS price $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
EVALUATION OF SAUSAGE (PORK AND PORK AND BEEF). PRECOOKED, FORZEN,
by H. R. Ignall. 6 May 63, 14p.
Task NT F014 13 002 69 58
Unclassified report

Descriptors: (*Frozen foods, Analysis). Food, Pork, Beef, Meat, Navy, Military rations, Acceptability.

An investigation of precooked pork and precooked pork and beef sausage was conducted to determine their suitability for Navy use. No appreciable differences were found between the products produced by the two packers when compared to each other for acceptability and average edible cooked yields, nor were any differences found between the two types of precooked sausage (pork and pork and beef). Both types of precooked sausage have greater acceptability and greater yields than conventional link sausage. On the basis of their edible cooked yields, both types of precooked sausage saved 27% of the weight required by the conventional, while those of one packer saved 42% in space and the other 22.5%. It was recommended that: (a) both types of precooked sausage (pork and pork and beef) be authorized for Navy use, (b) the precooked links be sized at 18-22 per pound to give the same edible cooked portion weight as the conventional at the same costs and, (c) the style of packaging which saved 42% stowage space be specified for Navy procurement. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-411 835 Div. 30
(TISTP/FEM) OTS price $7.60

Rand Corp., Santa Monica, Calif.
A GENERALIZED ASSEMBLY SYSTEM,
by G. H. Mealy. Aug 63, 71p. RM3646PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Compilers, Computers), (*Programming (Computers), Programming languages), Data processing systems, Digital computers, Data storage systems.

The first results of a program of research whose aim is to consolidate and extend the state of the art of computer assembly system design and implementation are presented. Assembly systems are, in a very real sense, the core of the modern programming systems used to prepare problems for calculation of solutions in digital computers. The importance of proper design of assembly systems is especially apparent in the implementation of such large programs as the control programs for SAGE and SACCS. The vehicle for this research has been the Generalized Assembly System (GAS), programmed in an experimental form for the IBM 7090 Data Processing System. This memorandum will be of interest to those concerned with the design and implementation of compilers and assembly systems. (Author)

AD-411 972 Div. 30
(TISTB/MS) OTS price $3.60

System Development Corp., Santa Monica, Calif.
RESEARCH DIRECTORATE PROGRESS REPORT,
ed. by C. Baum. July 63, 34p. Rept. no. TM530 631 00
Unclassified report

Descriptors: (*Scientific research, Reports), Bibliographies, Artificial intelligence, Data processing systems, Decision making, Mathematics, Operations research, Education, Information retrieval, Simulation.

Covers the period of January 1 through June 30, 1963, and supplements the more comprehensive annual Research Directorate Reports. Presents the major progress for each area of the Research Directorate. Gives a complete listing of all documents and programs produced during the report period, plus other significant information that is not obvious from these listings. States that more detailed information can be obtained from the referenced research papers or from the last annual report, TM530 006 00, published January 1963. (Author)

AD-412 318 Div. 30, 22
(TISTP/JP) OTS price $6.60

Miller Research Labs., Baltimore, Md.
DESIGN, DEVELOPMENT, AND FABRICATION OF AUTOMATIC FUZE TESTER.
Final rept.
21 Jan 63, 1v. Rept. no. FR95 1 62
Contract DA28 017 501ORD2404A
Unclassified report

Descriptors: (*Arming devices, Test equipment), (*Fuze functioning elements, Test equipment), Fuzes (Ordnance), Rotation.

A machine was evolved during the program which accepts fuzes placed on a conveyer belt, automatically subjects them to arm, noarm tests, and emits the units through ''accepted'' and ''rejected'' chutes. (Author)

AD-412 370 Div. 30
(TISTM/TCG) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
DEVELOPMENT OF VACUUM SYSTEM FOR MULTI-STAGE FLASH EVAPORATORS,
by J. H. Wright. 22 July 63, 12p.
Task Y R011 01 062
NCEL TN528 Unclassified report

Descriptors: (*Sea water, Desalination). (*Evaporators, Vacuum apparatus). (*Vacuum apparatus, Evaporation). Steam, Ejection, Air ejectors, Feed water, Distillation, Test equipment.

To develop a reliable vacuum system for sea water desalting systems, a variety of sizes and combinations of water-operated air ejectors were tested. Results showed that the three air ejectors tested produced the same closed suction vacuum, that only the staged system improved operation, and that there was no optimum combination. The 2-1/2-in. air and water ejectors were selected for further testing. The results of these tests indicate that the air ejector appears suitable for operation of desalting equipment. Cost of equipment, operation, and maintenance is attractive compared to that for present vacuum systems. Further investigation of ejectors is planned. (Author)

AD-412 449 Div. 30
(TISTB/WA) OTS price $4.00

Rucker Co., Oakland, Calif.
DESIGN STUDY FOR AN ACCELERATION RESEARCH DEVICE.
Final rept.,
by H. John Bates. May 63, 257p.
Contract AF33 616 7536, Proj. 7222, Task 722202
AMRL TDR62 113 Unclassified report

Report on Biophysics of Flight.

Descriptors: (*Acceleration, Centrifuges), Biophysics, Design, Engineering, Specifications, Scientific research, Simulation.

The report fulfills the following objectives: (1) Presents a tentative configuration and performance of a centrifuge and facility that best fits present and anticipated weapons systems. (2) Evaluates and adjusts the centrifuge design with respect to the research value of a specific performance requirement and its associated cost. (3) Presents a design which can be built with present-day knowledge and with assurance of meeting performance requirements. (4) Presents a design complete enough in detail to show its feasibility and to establish an estimated cost. (5) Recommends staging of construction and the staff personnel necessary to maintain and operate the facility. (Author)

AD-412 492 Div. 30
(TISTP/WH) OTS price $11.00

System Development Corp., Santa Monica, Calif.
SCHOPS MILESTONE 5, VOLUME 1,
by M. A. Franks. 15 July 63, 1v. TM795 001 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Satellite networks, Scheduling), (*Scheduling, Satellite networks), Satellites (Artificial), Tracking, Tests.

A series is outlined of validation and acceptance tests designed to show the capability of SCHOPS to schedule Satellite Control Facility (Satellite Tracking Annex and tracking station) operations. (Author)

AD-412 493 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS MILESTONE 11 GENERALIZED TAPE HANDLER (TAPE),
by H. J. Frieden. 13 June 63, 12p. Rept. no. TM715/054/00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Data processing systems, Magnetic tape, Satellite networks.

TAPE handles all tape input-output functions. This version of TAPE uses MTCII's TAPEIO to perform the requested tape operations. The advantage of using TAPE, instead of using TAPEIO directly, is that the calling sequence to TAPE is generally more convenient to use. (Author)

AD-412 522 Div. 30, 32
(TISTB/JAB) OTS price $1.60

System Development Corp., Santa Monica, Calif.
EXPANDING THE EDITING FUNCTION IN LANGUAGE DATA PROCESSING.
by L. B. Doyle. 10 July 63, 15p.
Unclassified report

Descriptors: (*Machine translation). (*Data processing systems, Language).

In automatic abstracting, citation indexing, mechanical translation, and other such procedures, editing is required whenever the automatic method leaves something to be desired. This paper discusses the economy of editing as a function of the amount of condensation of text in language processing operations, and then contends that editing can be regarded as an opportunity rather than as an unwelcome necessity. 'Heavy editing,' which goes beyond mere correction and improvement of computer output, is exemplified by the use of a concordance in preparing a survey article or lecture. Other opportunities for heavy editing are described, chief among them being interpretation and expansion of computer output in such processes as factor analysis. Applications are described, such as the quick, unbiased evaluation of a large volume of incoming mail or telegrams, yielding summary reports not possible for either humans or computers to produce alone. (Author)

AD-412 536 Div. 30, 18
(TISTP/FEM) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY PROGRAM DESCRIPTIONS MILESTONE 11 CONVERT BCD OCTAL TO FIXED, AND BCD DECIMAL TO FIXED OR FLOAT (DECOCT),
by R. L. Kinkead and G. D. Wilson. 1 July 63, 9p. Rept. no. TM715/028/01
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Control sequences, Computers, Satellite networks.

Reports that DECOCT converts a BCD octal number to its binary integer equivalent, a BCD decimal integer to its binary integer equivalent and a BCD decimal integer and fraction to its floating point equivalent. (Author)

AD-412 537 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS. BCD OCTAL TO BINARY CONVERSION (OCTBIN), by H. L. Kinkead. 12 July 63, 8p. Rept. no. TM705 045 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Numbers, Satellite networks.

BCD Octal to Binary Conversion (OCTBIN) converts octal integers of up to sixteen (16) digits encoded in BCD to their binary integer equivalents. (Author)

AD-412 539 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS. INTRODUCTION AND TABLE OF CONTENTS. 10 July 63, 5p. Rept. no. TM705 000 00D
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), (*Instruction manuals, Programming (Computers)), Satellite networks.

The Satellite Control Facility's Computer Program Systems Manual is a collection of systems programming and operations information brought together under one title. The manual consists of four TM series which are sub-titled Utility Programs, General Purpose Satellite Programs, Satellite Specific Programs, and Satellite Facility Computer Operations Procedures. (Author)

AD-412 540 Div. 30
(TISTP/FEM) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAMMING PROPOSALS. PROPOSAL FOR A TAPE TO PRINT ROUTING (STTP),
by W. E. Taber. 12 July 63, 3p. Rept. no. TM 890 014 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Magnetic tape), Input-output devices, Satellite networks, Digital computers.

The function Tape to Print (STTP) will be written to replace IBMTTP and all tapes written to be printed by IBMTTP can be printed by STTP. (Author)

AD-412 543 Div. 30
(TISTP/WH) OTS price $2.60

System Development Corp., Santa Monica, Calif.
1604 SIMULATION PROGRAM DESCRIPTIONS MILESTONE 11. THE SIMULATED TELEMETRY DATA DIRECT INPUT PROGRAM (STTGR),
by J. Ng. 24 July 63, 25p. Rept. no. TM734 040 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), (*Telemetering data, Simulation), Data processing systems, Satellite networks.

The Simulated Telemetry Data Direct Input Routine (STTGR) is a supplementary module of the SIPSA System (Ref. TM-734/015/00B) designed to provide PCM, PAN/FM, or FM/FM telemetry data to be used as input to the Bird Buffer or Indian Ocean Station Buffer (IOSB) telemetry programs. (Author)

AD-412 593 Div. 30, 25
(TISTM/EJH) OTS price $2.60

Sarah Mellon Scaife Radiation Lab., U. of Pittsburgh, Pa.
A NORMAL BEAM AUTOMATIC X-RAY DIFFRACTOMETER,
by Graham Gurr. 20 June 63, 20p.
Grant DA ARO D 31 124 G412
AROD Rept. no. 3975 1 Unclassified report

Descriptors: (*Crystal structure, Data processing systems), (*X-ray diffraction analysis, Automation), (*Data processing systems, Crystal structure), Automation, Programming (Computers), Computers, Feasibility studies, Single crystals, Semiconductors.

A device was constructed for the pre-programmed operation of a diffractometer for automatic collection of x-ray intensity data from single crystals. Programming data were read from IBM cards by a modified IBM model 026 key-punch. The resultant intensity data were punched on IBM cards with the same modified 026 key punch. An IBM 1620 was used to prepare the programming cards and to process the intensity data cards. (Author)

AD-412 697 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SCF COMPUTER PROGRAM SYSTEMS MANUAL UTILITY PROGRAMS: WRITE END OF TAPE (EOT),
by W. E. Taber. 12 July 63, 4p. Rept. no. TM705 044 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Data processing systems, Magnetic tape, Satellite networks.

EOT writes an end-of-file mark, four records each consisting of 'END-OF-TAPE,' a one word record, and a double end-of-file mark on any tape and rewinds the tape with or without interlock. (Author)

AD-412 698 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
UTILITY SYSTEM PROGRAM SPECIFICATIONS LIST CODES (SCODES),
by W. E. Taber. 21 June 63, 4p. Rept. no. TM831 016 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Specifications, Satellite networks.

The purpose of SCODES is to list the contents of the Codes Table. (Author)

AD-412 768 Div. 30
(TISTP/WH) OTS price $1.10

System Development Corp., Santa Monica, Calif.
PROPOSAL FOR AN ADDITIONAL PSEUDO OPERATION IN LARII,
by F. J. LaChapelle. 13 Dec 62, 3p. Rept. no. TM890 001 00
Contract AF04 695 40
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Satellite networks.

A full word zero (FWZ), a pseudo operation, is proposed. (Author)

AD-412 783 Div. 30, 18
(TISTP/FEM) OTS price $3.60

System Development Corp., Santa Monica, Calif.
INTEGRATED MILESTONE 4 AND INTERFACE SPECIFICATION FOR THE FIRST PROGRAM 162 TRANSITION FLIGHT SUPPORT TAPE,
by James J. Milanese. 8 July 63, 30p. Rept. no. TM1353 000 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Control sequences), (*Satellite networks, Digital computers), Magnetic tape, Telemetering data, Data transmission systems, Data processing systems, Input-output devices, Satellites (Artificial).

Preliminary computer programming specifications for the first Program 162 Transition Flight Support Tape, are presented, indicating the proposed computer program functions or subroutines, their primary purposes, unique logic, inputs and outputs. (Author)

AD-412 785 Div. 30
(TISTP/WH) OTS price $12.00

System Development Corp., Santa Monica, Calif.
COMPUTER OPERATING INSTRUCTIONS FOR THE FLIGHT SUPPORT TAPE USED IN SUPPORT OF 1100 SERIES VEHICLES. MILESTONE 7,
by Louis A. Kolbo. 26 Apr 63, 162p. Rept. no. TM L 1206 000 00
Contract AF19 628 1648
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Magnetic tape, Satellite networks.

A manual of operating instructions is presented for callable functions (programs) on 1100 Series Flight Support Tapes which are operated on the STC 1604 computer. Functions which are applicable to FTV 1161 and will be updated as required to reflect changes for future vehicles are included. (Author)

AD-412 798 Div. 30, 8
(TISTP/WH) OTS price $5.60

International Business Machines Corp., Rockville, Md.
OPTIMIZED DIGITAL MAPPING SYSTEM.
Interim rept. no. 1, 1 Feb-1 May 63.
30 May 63, 47p.
Contract DA44 009AMC111X, Proj. 8T35 14 001 07
Unclassified report

Descriptors: (*Digital systems, Mapping), (*Mapping, Digital systems), (*Analog-digital computers, Stereoscopes), Surveying, Digital computers, Programming (Computers), Digital computers, Cathode ray tubes, Optimization.

The primary purpose of the DAMC project is to optimize system hardware and computer programs developed and to develop and evaluate alternate correlation techniques. The objective is to conclusively prove the concept of digital map compilation. The system consists of a photo-digitizer unit for scanning and digitizing a pair of stereo aerial diapositives, specially written computer programs for use on a IBM 7090 Computer to perform a rectification, correlation, and ortho-correction on the digital photo data, and a photomap printer unit for printing the rectified photo or orthophotomap with or without contour and grid tic information. The investigation section presents a detailed theoretical analysis of major portions of the DAMC system with particular emphasis on the non linearities associated with the CRT and optical equipment. (Author)

AD-412 823 Div. 30
(TISTP/FR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DIFFERENTIAL BAROGRAPH WITH PHOTOGRAPHIC RECORDING OF THE READINGS,
by Yu. S. Dobrokhotov. 28 June 63, 16p.
FTD TT63 535 Unclassified report

Trans. from Trudy Instityta Fiziki Zemli im. O. Yu. Shmidta, Issledovaniya Po Instrumental'noy Gravimetrii, 24, pp. 116-123, 1962.

Descriptors: (*Barometers, Photographic recording systems), Thermometers, Optical equipment.

An instrument intended for continuous recording of changes in atmospheric pressure is described. It is called a differential barograph. Its sensitivity is 10-12 times higher than the sensitivity of a mercury barometer. There are no metal springs in the instrument; therefore its readings are free from the distorting effect of hysteresis and elastic aftereffect. The instrument was initially intended for observations of barometric leveling at field stations; later it began to be used for control observations when studying certain geophysical phenomena. In particular, it was used at the Institute as a control instrument when studying terrestial tides. The barograph can also be used in those cases where increased demands are made on the accuracy of recording atmospheric pressure. (Author)

AD-412 880 Div. 30
(TISTM/EJH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC COLD (HORIZONS OF SCIENCE),

by B. Verkin, A. Galkin and I. Dmitrenko.
12 June 63, 6p.
FTD TT63 513 Unclassified report

Trans from Russian Newspaper, Izvestiya, p. 6
2 November 1960.

Descriptors: (*Cryogenics, Scientific research), (*Low temperature research, Scientific research).

AD-413 019 Div. 30, 8
(TISTP/FEM) OTS price $14.50

Arinc Research Corp., Washington, D. C.
COMPUTER RELIABILITY STUDY.
Final rept., 1 July 62-30 June 63,
by Donald O. Baechler and David E. Van Tijn.
July 63, 203p. Rept. no. 240 01 1 374
Contract AF04 659 147, Proj. 63 150
SSD TDR63 150
Unclassified report

Descriptors: (*Digital computers, Reliability), (*Reliability, Computers), (*Computer logic, Performance (Engineering)), Identification, Errors, Electrical networks, Electronic equipment, Reliability (Electronics), Redundant components, Guided missile computers, Modules (Electronic), Real time, Control sequences, Gates (Circuits), Relaxation oscillators, Failure (Mechanics), Probability.

The problem of increasing the reliability of digital computers is approached on the basis that not all part failures result in computer failures. A measure of performance, which measures computer failures, rather than part failures, is developed. Two techniques for increasing reliability are developed, and the value of these is demonstrated by application of the measurement method. The basic logic design of a digital computer is presented. Techniques for increasing the reliability of the computer are incorporated in the design, and the measure of performance developed in the report is used to evaluate and compare the original and modified designs. (Author)

AD-413 051 Div. 30, 15
(TISTP/FEM) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WORKS OF THE V. A. STEKLOV MATHEMATICAL INSTITUTE (SELECTED ARTICLES).
13 June 63, 34p.
FTD TT63 449 Unclassified report

Trans. from Trudy Matematicheskogo Instituta imeni V. A. Steklova, Izd. AN SSSR, 46, pp. 4-15 and 37-44, 1962.

Descriptors: (*Programming (Computers), Theory), (*Computers, Differential equations), Numbers, Matrix algebra, Vector analysis, Data processing systems, Operators (Mathematics), Polynomials, Numerical methods and procedures.

AD-413 290 Div. 30, 32, 25, 2, 8
(TISTP/FEM) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION. (16 JUNE 1963 THROUGH 15 JULY 1963),
by Frances A. Brady. 31 July 63, 4p. Rept. no. CSR269 9990PP1
Contract AF04 695 269
Unclassified report

Descriptors: (*Reports, Documentation), (*Research program administration, Reports), Geophysics, Satellites (Artificial), Electrical engineering, Physics.

AD-413 305 Div. 30, 15
(TISTP/WH) OTS price $2.75

Vitro Labs., West Orange, N. J.
A MATHEMATICAL TECHNIQUE FOR AUTOMATIC FAULT ISOLATION IN A COMPLEX SYSTEM.
Final rept.,
by S. I. Finekl, R. N. Nilsen, and E. St. Clair.
May 63, 112p.
Contract AF33 657 9184, Proj. 8119, Task 811927
ASD TDR63 409 Unclassified report

Descriptors: (*Checkout procedures, Electronic equipment), (*Electronic equipment, Checkout procedures), (*Digital computers, Checkout equipment), Programming (Computers), Sequential analysis, Matrix algebra, Programming languages Vector analysis.

The application is described of a mathematical technique which develops the construction of a recognition matrix which, when pre-multiplied by a vector whose components represent selected test measurements, yields another vector whose components identify the system element which is out of tolerance. This fault isolation process is applicable to any equipment level, proceeds to the next lower level, and thus to the piece-part. Because of the simplicity of the arithmetic operations to be performed, the technique can be readily programmed for any general-purpose digital computer. (Author)

AD-413 370 Div. 30
(TISTB/MS) OTS price $9.60

Systems Research Center, Case Inst. of Tech., Cleveland, Ohio.
AN ELEMENTARY INFORMATION PROCESSOR FOR OBJECT RECOGNITION,
by James C. Pennypacker. May 63, 105p. Rept. no. SRC30I63 1
Grant AF AFOSR125 63
AFOSR 5112 Unclassified report

Descriptors: (*Cybernetics), (Pattern recognition), (*Digital computers), (*Artificial intelligence).

A Concept is defined to be a class of objects whose members can be distinguished by processing its properties. A Property is defined to mean a partition of the set of all objects into disjoint classes. The concept is described by a Conception, which is a list structure. The conception of a concept is built up from elementary conceptions by a recursive process and is an abbreviated form of the description list structure described by R. B. Banerji in an earlier paper. A processor, which consists of a series of computer flow charts, is described. The processor is capable of forming conceptions of known and new concepts and is capable of processing information relevant to these concepts. In addition, the processor is capable of elementary learning. (Author)

AD-413 443 Div. 30, 12
(TISTW/PCR) OTS $6.60

Boeing Co., Seattle, Wash.
FUNCTIONAL TEST PROCEDURES FOR ABLATION METERS AND CALORIMETERS FOR MINUTEMAN R&D MISSILES,
by E. Mills. 23 Sep 60, 1v. Document no. D2 7679
Contract AF04 647 289
Unclassified report

Descriptors: (*Ablation, Meters), (*Calorimeters, Guided missiles (Surface to surface)), Strategic weapons, Test vehicle, Test equipment, Test methods, Airborne, Transducers, Tests, Resistance (Electrical), Vibration, Calibration.

The objective of this document is to provide requirements and procedures for functional testing the airborne calorimeters and ablation gages to be used in the minuteman R&D missiles. The document is divided into two sections; Section 1 is devoted to the test requirements and procedures for calorimeters and Section 2 is devoted to the test requirements and procedures for calorimeters and Section 2 is devoted to the test requirements and procedures for ablation gages. Each section includes data sheets that are to be filled out completely for each unit during testing and submitted to the Transducers and Signal Conditioners Group of the Instrumentation Unit immediately after the testing is completed. (Author)

AD-413 481 Div. 30
(TISTP/FEM) OTS price $1.60

Washington U., Seattle.
A GENERAL UTILITY CORRELATION PROGRAM FOR IBM 709 WITH PROVISIONS FOR MISSING DATA,
by Richard C. Sorenson, Thomas D. F. Langen, and Paul Horst. Jan 63, 12p.
Contract Nonr47733 and Grant M743C7
Unclassified report

Descriptors: (*Programming (Computers), Statistical analysis), (*Data processing systems, Punched cards), Data, Errors, Statistical processes, Input-output devices, Programming languages, Control sequences, Correlation techniques, Digital computers.

A program is reported to compute the basic statistics and symmetrical correlation matrix for variables for which some data may be missing. Inasmuch as the Bureau of Testing is frequently asked for a correlation program for a battery of variables of differing score form, provision has been made for varying the format of the data cards. Oftentimes those requesting the program vary from computer sophisticates to statistical novices. This report is designed to serve the latter and will thus include detail that is not usually found in papers of this nature. (Author)

AD-413 528 Div. 30
(TISTA/GEC) OTS price $6.60

Naval Ordnance Test Station, China Le, Calif.
SMALL SCALE DIFFUSER STUDIES,
by William F. Thorn. May 63, 62p.
NAVWEPS Rept. 8067; NOTS TP3073
Unclassified report

Descriptors: (*Exhaust diffusers, Altitude chambers), (*Rocket motors (Solid propellant), Model tests), Thrust vector control systems, Nozzles clusters, Second stage motors, Guided missiles (Underwater to surface), High altitude, Simulation.

A complete description and analysis of a small-scale cold-flow diffuser model study are reported. The work was performed to provide a basis for a full-scale high-altitude simulator design for the POLARIS A3 second-stage engine diffuser. Data and results of the small-scale tests are presented and an empirical design approach is outlined. (Author)

AD-413 529 Div. 30, 15
(TISTP/MFA) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MACHINE PERCEPTION OF THREE-DIMENSIONAL SOLIDS,
by L. G. Roberts. 22 May 63, 40p. TR315
Contract AF19 628 500
Unclassified report

Descriptors: (*Pattern recognition, Computers), (*Solids, Topology), (*Geometric forms, Analysis), Inequalities, Transformations (Mathematics), Photographic analysis, Projective geometry, Display systems.

In order to enable a computer to construct and display a three-dimensional array of solid objects from a single two-dimensional photograph, the rules and assumptions of depth perception have been carefully analyzed and mechanized. It is assumed that a photograph is a perspective projection of a set of objects which can be constructed from transformations of known three-dimensional models, and that the objects are supported by other visible objects or by a ground plane. These assumptions enable a computer to obtain a reasonable, three-dimensional description from the edge information in a photograph by means of a topological, mathematical process. A computer program has been written which can process a photograph into a line drawing, transform the line drawing into a three-dimensional representation, and finally, display the three-dimensional structure with all the hidden lines removed, from any point of view. The 2-D to 3-D construction and 3-D to 2-D display processes are sufficiently general to handle most collections of planar-surfaced objects and provide a valuable starting point for future investigation of computer-aided three-dimensional systems. (Author)

AD-413 586 Div. 30
(TISTA/VGW) OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FIVE COMPONENT ELECTRIC AERODYNAMIC BALANCES,
by A. P. Biryulin, Ye. I. Karulin and A. G. Lysyakov. 28 May 63, 5p.
FTD TT63 379 Unclassified report

Trans. from Russian patent nr. 135345, (Appl. Nr. 649975/27, pp. 1-3, 5 Jan 1961.

Descriptors: (*Balances, Design), Test equipment, Instrumentation, Moments, Aerodynamic loading.

AD-413 597 Div. 30
(TISTP/FEM) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVELOPMENT OF SCIENCE IN THE SIBERIAN BRANCH OF THE ACADEMY OF SCIENCES OF THE USSR.
11 June 63, 31p.
FTD TT63 239 Unclassified report

Trans. from Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No. 1, pp. 3-16, 1960.

Descriptors: (*Scientific research, Research program administration), Education, Biology, Electrical engineering, Computers, Radio communication systems, Radio chemistry, Physical properties, Chemistry, Mathematics, Medical research.

AD-413 722 Div. 30
(TISTP/FR) OTS price $1.60

Hughes Aircraft Co., Culver City, Calif.
(No title).
Monthly progress rept. no. 9, 1-28 July 63.
29 July 63, 12p.
Contract AF04 695 210
Unclassified report

Descriptors: (*Programming (Computers), Reliability), Digital computers, Computer logic.

AD-413 788 Div. 30
(TISTE/RAM) OTS price $8.10

ITEK Corp., Waltham, Mass.
EXPERIMENTAL MODEL UNIT RECORD SEARCH AND DISSEMINATION DEVICE.
Final rept.
Aug 63, 74p.
Contract AF30 602 2569, Proj. 4594, Task 45822
RADC TDR63 291
Unclassified report

Descriptors: (*Data processing systems, Records), Data, Storage systems, Magnetic tape, Punched cards, Photographic recording systems, Optical scanning, Input-output devices, Coding, Switching circuits, Computer logic, Model tests.

A detailed analysis is provided of the work involved in the development of the Experimental Model, Unit Record Search and Dissemination Device, built under contract AF30(602)2569. The purpose of the model was to assist in the formulation of design parameters associated with several new techniques in file manipulation, including search, dissemination, sorting, and collating. The significance of this program is that a group of techniques for handling unit records have been developed which are applicable to nearly all the functions required in any record handling system. These techniques include the use of air as the prime mover of information and code bearing cards, on-the-fly code reading, and mechanical path selection and switching. (Author)

AD-413 807 Div. 30
(TISTP/FR) OTS price $1.60

American Meteorological Society, Boston, Mass.
HYDROMETEOROLOGICAL RESEARCH DURING THE INTERNATIONAL GEOPHYSICAL YEAR (Gidrometeorologicheskie issledovaniia v Mezhdunarodnom geofizicheskom godu),
by F. F. Davitaia, tr. by John Miller, 1962, 12p.
Contract AF19 604 6113
Unclassified report

Trans. from Meteorologiia I Gidrologiiak , No. 12, pp. 3-8, 1956.

Descriptors: (*Scientific research, Meteorology).

AD-413 808 Div. 30
(TISTP/WA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTRICAL DISCHARGE IN WATER,
by N. V. Fillipov, V. V. Zhurin, and V. A. Sulyayev. 27 May 63, 7p.
FTD TT63 385 Unclassified report

Trans. from Inzhenernyy Zhurnal, 2:4, pp. 341-343, 1962.

Descriptors: (*Electric discharges, Water), (*Water, Electric discharges), Capacitors, Pressure, Shock waves, Theory.

AD-413 925 Div. 30
(TISTA/FRL) OTS price $4.60

Fabric Research Labs., Inc., Boston, Mass.
DEVELOPMENT OF A COMPRESSION IMPACT TESTING MACHINE.
Final summary rept.
24 June 63, 1v.
Contract DA19 129qm1905
Unclassified report

Descriptors: (*Test equipment, Compressive properties), Impact shock, Design, Instrumentation, Weight, Operation, Oscilloscope, Maintenance, Vibration isolators, Materials, Accelerometers, Velocity.

Reported is a compressive impact test device developed and designed to provide means for dynamic testing of cushioning materials. Test machine specifications established by the Army required impact speeds in a range from 20 to 60 feet per second, and an energy level of up to 12,000 foot-pounds. Instrumentation includes a shock accelerometer which senses deceleration force during the impact, and an electromagnetic velocity measurement system which measures relative velocities of the two cars before, during, and after the deformation of the test specimen. Outputs of the two measured variables are displayed and photographed on a dual beam oscilloscope. (Author)

AD-413 929 Div. 30, 15
(TISTP/MS) OTS price $7.60

International Research Inst., Princeton, N. J.
INTRODUCTION TO SEMI-AUTOMATED MATHEMATICS.
Final rept.,
by Thomas H. Mott, Jr., James R. Guard, James H. Bennett and William B. Easton. 15 Apr 63, 72p.
Contract AF19 628 468, Proj. 5632, Task 563205
AFCRL 63 188 Unclassified report

Descriptors: (*Programming (Languages), Mathematical logic), (*Programming (Computers), Simulation), Automatic, Errors, Data processing systems, Groups (Mathematics).

The subject of this report is mechanical theorem proving, and in it are described two computer programs that represent an approach different from the usual ones based on the Herbrand Theorem in which the computer unaided seeks to construct proofs. In the approach described here, non-algorithmic proof procedures are employed and the basic function of the computer is to render as much assistance as possible to the mathematician in specifying such procedures. To aid in this function, two programming languages and associated processors have been written that provide a logical language, closely resembling the language of mathematical logic, for specifying to the computer exact procedures for building proofs in the propositional calculus and first-

order axioms systems. One language is based on a natural deduction formulation of the propositional calculus, and the other on an axiomatic formulation of any first-order axiom system such as elementary group theory and set theory. Among the provisions of the latter language is a command for generating the most general relevant substitution instances of axioms and theorems already proved. (Author)

AD-414 059 Div. 30
(TISTM/ODN) OTS price $1.10

Michigan U., Coll. of Engineering, Ann Arbor.
STUDY OF MAGNETIC AND ELECTRIC PHENOMENA IN FERRIMAGNETIC MATERIALS.
Final rept.,
by Dale M. Grimes. 12 Feb 63, 3p. Rept. no. 04316
Contract AF49 638 986
AFOSR 4928 Unclassified report

Descriptors: (*Ferromagnetic materials, Research program administration), Magnetic properties, Electrical properties.

AD-414 068 Div. 30, 15
(TISTP/WH) OTS price $1.60

Case Inst. of Tech., Cleveland, Ohio.
ABSTRACT SORTING ALGORITHMS.
Final technical rept., 1 Jan-31 Dec 62,
by R. J. Nelson. 10 June 63, 13p
Grant AF AFOSR 62 203
AFOSR 4938 Unclassified report

Descriptors: (*Digital computers, Computer logic), (*Computer logic, Digital computers), Algebras, Combinatorial analysis, Design, Groups (Mathematics).

31. SHIPS AND MARINE EQUIPMENT

AD-411 980 Div. 31
(TISTE/WA) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
BASE-VENTED PROPELLER,
by G. G. Mosteller. May 63, 26p.
NOTS Rept. no. TP3061; NAVWEPS 8058
Unclassified report

Descriptors: (*Torpedo components, Propeller blades), (*Propeller blades, Torpedo components), Design, Water tunnels, Tests, Test methods, Instrumentation, Statistical data, Cavitation, Naval research.

This report describes the design and testing of a propeller with base-vented blades. A semi-ellipse with a parallel afterbody was chosen as a cross section for the blades. This shape, with a trailing cavity, has a lower cavitation index than a blade section of the same thickness ratio that converges to a thin trailing edge. The blade shape has a large area moment for increased strength and a relatively large leading-edge radius, which reduces the tendency for a low-pressure region to develop at the leading edge attributable to an off-design angle of attack. The low cavitation index allows the blade to operate at moderate depths at high forward velocity and rpm. (Author)

AD-412 788 Div. 31
(TISTE/AAR) OTS price $5.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
SERIES 63, ROUND BOTTOM BOATS,
by Petros Michael Beys. Apr 63, 7p. Rept. 949
Contract Nobs78349, Task Order 4
Unclassified report

Descriptors: (*Boats, Design), Models, Analysis, Effectiveness, Specifications, Power.

This report presents the results of experimental testing to determine the calm water performance of five round-bottom utility boats. The models were all 1/16-scale, furnished by the David Taylor Model Basin. The purpose of this investigation is to provide BuShips with systematic resistance data for round-bottom hull forms operating in the displacement and semi-planing speed ranges. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-411 939 Div. 32, 23
(TISTB/WA) OTS price $2.60

Federal Council for Science and Tech., Washington, D. C.
SCIENTIFIC AND TECHNICAL INFORMATION IN THE FEDERAL GOVERNMENT.
Status rept.
18 June 63, 18p.
Unclassified report

Descriptors: (*Information retrieval, Analysis), (*Documentation, Processing), Scientific research, Effectiveness, Handling, Budgets, Communication systems, Education, Training.

This report summarizes the recent advances and the present status of Federal efforts to improve the handling of scientific and technical information. (Author)

AD-412 335 Div. 32
(TISTB/MS) OTS price $1.60

General Electric Co., Philadelphia, Pa.
A BRIEF LOOK AT SOVIET MANPOWER PROBLEMS FOR SPACE PROGRAMS,
by H. C. Sebring. 1 Oct 62, 14p.
Unclassified report

Descriptors: (*Astronautics, Research program administration), (*Personnel, Astronautics), (*Economics, Analysis), Population, United States Government, Federal budgets, Budgets, Labor, Automation, Industries, Professional personnel, Education, Communists.

The indications are that the Soviets will be increasingly squeezed for manpower to continue

the competition in space development. The populations of the U.S. and U.S.S.R. are roughly the same. The Soviet Gross National Product (GNP) and standards of living, even by 1970, will be less than 50% of the U.S.; yet, Soviet military expenditures are about the same as ours. The output per capita in the U.S.S.R. is approximately 63% of the U.S., indicating a lag in automation and other modern manufacturing techniques. But the Soviet space goals are essentially the same as those of the U.S. There are three factors which could permit the Soviets to significantly reduce manpower deficits. First, outdistancing the U.S. in training engineers and scientists. Second, steadily increasing the productive output per capita. Finally, failure of the U.S. to design its Gross National Product optimally focused on goals. (Author)

AD-412 523 Div. 32, 12
(TISTB/JAB) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION 16 JUNE 1962 THROUGH 15 JUNE 1963,
by Frances A. Brady. 30 June 63, 32p. Rept. no. CSR 169 9990 APP 1
Contract AF04 695 169
Unclassified report

Rept. no. CSR-169(9990)APP-1 supersedes Rept. no. CSR-169(9990)PP-1 through Rept. no. CSR-169(9990)PP-11.

Descriptors: (*Scientific research, Reports), (*Bibliographies, Astronautics).

AD-412 644 Div. 32
(TISTB/MS) OTS price $5.60

Aerospace Information Div., Washington, D. C.
SOVIET BIOASTRONAUTICS AND BIOTECHNOLOGY FACILITIES. PROGRAMS. PERSONALITIES.
Summary of data.
9 July 63, 49p.
AID Rept. P63 95 Unclassified report

Descriptors: (*Space biology, Reviews), (*Space flight, Life support), (*Space medicine, Physiology), (*Astronauts, Selection), (*Closed cycle ecological systems), Telemeter systems, Cardiovascular system, Blood circulation, Urine, Plants (Botany), Algae, Radioprotective agents, Wastes (Sanitary engineering), Disposal.

AD-412 655 Div. 32
(TISTB/AMS) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
TIPS TO AUTHORS ON FORMAT AND PREPARATION OF MATERIAL FOR REPRODUCTION.
Aug 61, 39p.
NOL Rept. no. NOLX35
Unclassified report

Descriptors: (*Documentation, Naval research laboratories), (*Naval research laboratories, Documentation), Indexes, Military publications, Pictures, Records, Reports, Reviews, Abstracts, Textbooks, Personnel.

This publication contains information on the preparation of publications at the Naval Ordnance Laboratory and should be used as a reference and guide by NOL personnel. These rules and time-tested policies should enable authors to achieve uniformity and consistency and should expedite preparations of NOL publications. (Author)

AD-412 658 Div. 32
(TISTA/GEC) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
QUARTERLY BIBLIOGRAPHY OF REPORTS PREPARED UNDER CONTRACT NO. AF04(695-169 (PERIOD COVERING 1 APRIL THROUGH 30 JUNE 1963),
comp. by Barbara H. Peer. 15 July 63, 1v. Rept. no. CSR169 9990QBR4
Contract AF04 695 169
Unclassified report

Descriptors: (*Air force research, Bibliographies), (*Reports, Bibliographies), Research program administration.

This bibliography lists all reports published during the period 1 April through 30 June 1963 under Contract AF 04(695)-169. (Author)

AD-412 723 Div. 32
(TISTB/JAB) OTS price $2.60

Institute for Cooperative Research, U. of Pennsylvania, Philadelphia.
ON THE ROLES OF SPECIALIST LABOR IN RETRIEVAL. PART A.
by John O'Connor. 1963, 29p.
Contract Nonr418300
Unclassified report

Descriptors: (*Information retrieval), (*Subject indexing, Theory), Automatic, Quality control.

Study of the possibilities of mechanized indexing leads to the question of what characteristics indexing ought to have, by whatever means it is produced. This leads in turn to some questions about the whole process of subject document retrieval (retrieval of documents about a specified subject). Discussion of these latter questions can be carried some way at a more general level. Thus in the present report, and in some successors, there will be no explicit reference to subject document retrieval, although it will be the application of ultimate interest. (Author)

AD-412 843 Div. 32
(TISTB/MS) OTS price $2.60

Rand Corp., Santa Monica, Calif.
SINO-SOVIET ECONOMIC RELATIONS 1958-1962,
by Oleg Hoeffding. Aug 63, 23p. Memo. RM3787PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Foreign policy, Commerce), Economics, Economic warfare.

The peak in Sino-Soviet trade was reached in 1958-1959, when it accounted for half of China's total trade. It declined heavily in 1960-1962, as did China's trade with Eastern Europe. The decline reflected China's economic crisis as well as the Sino-Soviet conflict. Apart from the recall of Soviet experts in 1960, there is no clear evidence of overt Soviet economic warfare. The USSR exerted severe economic pressure, but did so in the businesslike guise of cutting exports to China, in response to China's reduced ability to pay. However, the USSR has tempered this close-fisted attitude with a few semi-charitable gestures. Comercial relations, although visibly strained by the political dis-

pute, have remained formally correct. But the collapse of China's trade with the Bloc, the severe curtailment of imports other than grain from the West in 1961-1963, and poor prospects of obtaining long-term credits in the West have deprived China of the opportunities she had prior to 1960 of harnessing foreign trade to the needs of her industrialization drive. Peking's all-round intransigeance, for the time being, makes China virtually the only underdeveloped country not receiving economic aid from any source. (Author)

AD-413 143 Div. 32
(TISTE/CAM) OTS price $8.10

RAND Corp., Santa Monica, Calif.
DECENTRALIZED RESOURCE ALLOCATION WITH A MODICUM OF INCREASING RETURNS,
by Stephen A. Marglin. July 63, 76p.
Memorandum RM3421PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Management engineering, Industrial production), (*Industrial production, Feasibility studies), (*Economics, Theory), Agriculture, Fertilizer, Costs, Distribution (Economics), Production, Logistics.

The problem explored in this essay is the possibility of decentralizing the allocation of inputs among many producers, endowed by nature with different production functions, in order to maximize the output of a single commodity. The results described extend in some respects the range of technologies to which decentralized allocation procedures can, at least conceptually, be applied. The particular decentralized allocation scheme explored is a formalized version of the Lange-Lerner algorithm, in which the ministry of production announces a trail price for each input and producers demand quantities of inputs to maximize shadow profits at the announced trial price vecotr. The vector is revised by changing its components in proportion to the excess demands (that is, total demands minus supplies) resulting from profit maximization at the announced prices. The process is repeated in the hope of reaching a price vector which is an equilibrium set of prices in the sense that the sum of producers' profit-maximizing demands just equals supplies, so that every producer is at a position from which he has neither incentive nor need to move; for such an equilibrium always represents an optimal allocation of inputs. (Author)

AD-413 394 Div. 32
(TISTB/JAB) OTS price $1.60

Air Force Office of Scientific Research, Washington, D. C.
CURRENT TRENDS IN DOCUMENTATION RESEARCH.
1963, 13p.
AFOSR 5125 Unclassified report

Presented at the Symposium on Biomedical Information, 47th Annual Meeting, Federation of American Societies for Experimental Biology, 17 Apr 1963, Atlantic City, N. J.

Descriptors: (*Documentation, Scientific research), Language, Logistics).

AD-413 773 Div. 32
(TISTB/AAR) OTS price $1.60

Herner and Co., Washington, D. C.
PERMUTEXT INDEXING,
by Saul Herner. 1963, 12p.
Contract AF49 638 1182
AFOSR 9945 Unclassified report

Descriptors: (*Indexes, Analysis), Reviews, Documentation, Abstracts, Bibliographies.

AD-413 858 Div. 32, 14
(TISTM/TCG) OTS price $14.50

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN INDEX TO NON METALLICS R&D PROGRAMS OF TEN AEROSPACE COMPANIES.
9 May 63, 213p.
Task 738103
ASD Rept. no. ASRCE TM62 24, Suppl. 1
Unclassified report

Descriptors: (*Indexes, Materials), (*Materials, Indexes), (*Spacecraft, Scientific research), (*Scientific research, Spacecraft), Adhesives, Adhesive tapes, Binders, Cements, Ceramic materials, Coatings, Elastomers, Foams, Hydraulic fluids, Thermal insulation, Lubricants, Metals, Paints, Plastics, Corrosion, Mechanical properties, Ablation, Dielectric properties.

AD-414 066 Div. 32
(TISTB/WA) OTS price $1.10

National Institutes of Health, Bethesda, Md.
DESIGN OF LABORATORY FACILITIES. A CLASSIFIED LIST OF SELECTED REFERENCES, SUPPLEMENT I. 1949-1963,
comp. by Gertrude Fox. July 63, 6p.
Unclassified report

Descriptors: (*Medical laboratories, Design), (*Bibliographies, Medical laboratories), Hospitals, Site selection, Radiobiology, Radiation chemistry, Industrial research.

33. TRANSPORTATION

AD-412 338 Div. 33
(TISTA/GEC) OTS price $7.60

Federal Aviation Agency, Washington, D. C.
AIRPORTS AND HELIPORTS: DESIGN CONSTRUCTION AND MAINTENANCE. SELECTED REFERENCES.
July 63, 69p.
FAA Bibliographic list no. 9
Unclassified report

Descriptors: (*Airports, Bibliographies), (*Bibliographies, Airports), Terminal flight facilities, Design, Construction, Maintenance, Helicopters, Landing aids, Runways, Buildings, Hangars, Ground support equipment, Materials, Configurations, Foundations (Structures), Taxiing, Landing fields, Approach lights.

This bibliography on ''Airports and Heliports: Design, Construction and Maintenance'' as a partially annotated compilation of selected references with international coverage from 1959 to date. It has been arranged by subject. (Author)

Division 33 - TRANSPORTATION

AD-412 839 Div. 33
(TISTA/GEC) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
MAXIMUM PAYLOADS PER UNIT TIME DELIVERED THROUGH AN AIR NETWORK,
by George B. Dantzig and David L. Johnson.
June 63, 11p. Rept. no. D1 82 0265
Unclassified report

Also available from the author.

Descriptors: (*Air transportation, Payloads), (*Air traffic payloads), Civil aviation, Scheduling, Operations research.

Optimizing the flow of aircraft through a network of bases requires some modification of the standard network flow algorithms because of the special nature of air transportation. The payload carried by an airplane is a function of the distance between refueling stops, as well as field conditions at the bases; and in general the maximum allowable payload is not the same on all arcs of the network. Thus the shortest route through a network is not necessarily the route of maximum payload flow per hour of flight time, a trivial example being a plane which can fly non-stop from origin to destination but only with zero payload. Two air network problems analogous to the shortest path and the maximum flow problems are considered. These are the route of maximum payload flow per hour of flight time and the maximum steady-state payload flow through a network with base capacity constraints. (Author)

AD-413 450 Div. 33, 1
(TISTA/GEC) OTS price $18.00

Airborne Instruments Lab., Inc., Deer Park, N. Y.
AIRPORT CAPACITY. A HANDBOOK FOR ANALYZING AIRPORT DESIGNS TO DETERMINE PRACTICAL MOVEMENT RATES AND AIRCRAFT OPERATING COSTS.
June 63, 1v.
Contract FAA BRD136, Proj. 412 7 1R
Unclassified report

Descriptors: (*Airports, Air traffic), Air transportation, Scheduling, Design, Runways, Configurations, Airplane landings, Take-off, Taxiing, Economics, Experimental data, Analysis, Instrument landings, Costs, Transport planes, Jet transport planes, Commercial planes, Jet training planes, Utility planes, Observation planes.

To determine the adequacy of existing or future airport designs in coping with the steady yearly increases in aircraft traffic rates, some accurate means of analyzing airports must be provided to determine capacities in terms of both the movement rates and the aircraft operating costs resulting from the rates of flow of aircraft. This handbook is the result of research into airport operation and has involved studies of aircraft characteristics and pilot/controller requirements and techniques. Much of the data was obtained from exhaustive field surveys. It is designed to permit the user to determine: Capacity of a given airport; Relationship of the capacity of a given airport to the traffic demand; and Effects of the capacity and demand on airport improvements or changes and vice versa. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

PB 163 648 OTS $1.10

Army Chemical [Research and Development] Labs., Army Chemical Center, Md.
JOURNAL ARTICLES JANUARY-JUNE 1959, comp. by Peter S. Deck. Sep 59, 10p 19refs
CWL Special pub. 4-13

DESCRIPTORS: *Bibliographies, *Chemical warfare, *Chemistry, *Medicine.

This list of articles published in journals during January-June 1959 was compiled from reprint orders and notifications of publication made available by the authors. (See also PB 145 635)

PB 163 649 OTS $1.60

Army Chemical [Research and Development] Labs., Army Chemical Center, Md.
JOURNAL ARTICLES JULY-DECEMBER 1959, comp. by Peter S. Deck. Apr 60, 19p 51refs
CWL Special pub. 4-19

DESCRIPTORS: *Bibliographies, *Chemical warfare, *Chemistry, *Medicine.

This list of articles published in journals during July-December 1959 was compiled from reprint orders and notifications of publication made available by the authors. The appendix lists those articles that would have been included in Special Publications 4-6, 4-13, and 4-14 if notification had been received by the time those publications were compiled. (See also PB 163 648)

LAMS-2895 OTS $4.50

Los Alamos Scientific Lab., N. Mex.
SELECTED BIBLIOGRAPHY OF PUBLICATIONS OF LASL RESEARCH 1957-1962, by Barbara Hendry and Marjorie Johnson. 13 Jun 63, 364p
Contract W7405-eng-36.

SCR-600 OTS $2.00

Sandia Corp., Albuquerque, N. Mex.
CIVILIAN APPLICATION RELEASES THROUGH 1962. Bibliography. Jan 63, 86p
Contract AT(29-1)789
SCR-500, rev

Technical Information Service, Washington, D. C.
MOON EXPLORATIONS. Special bibliography Index, comp. by Nina Holt Bradshaw, Bette Archer Starness, Gwenn Keithley, Lesley Zark and James R. Brilhart. May 63, 270p 215refs

Available for $40.00 from
Technical Information Service
432 Woodward Building
15th & H Streets, N. W.
Washington, D. C. 20005

DESCRIPTORS: *Bibliographies, *Space flight, *Moon, *Lunar probes, *Astrophysics.

This search presents 215 reports covering the period from June 1956 through October 1962. The material is selected from the literature publicized in U.S. Government Research Reports. Part I of this 10-part Special Bibliography/Index is the basic part, and consists of two sections: (A) ASTIA Documents (Items 1-125); (B) Non-Military and Older Military Research Reports (Items 126-215). Parts II thru VIII cross-reference specific data given in Part I. Part IX - Key to Series Abbreviations. Part X - Key to Issuing Agencies.

ASTRONOMY

Astrophysics

EFINS-62-50 OTS $8.10

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
METEORITES AND THE EARLY HISTORY OF THE SOLAR SYSTEM, by Edward Anders. Aug 62, 89p
Contract AT(11-1)382

NASA N63-17315 repriced OTS $2.25

Geophysics Corp. of America., Bedford, Mass.
PLANETARY AERONOMY X; ATOMIC POLARIZABILITIES AND SHIELDING FACTORS, by A. Dalgarno. Rept on Contract NASw-395. Feb 63, 87p. 96 refs. GCA TR-63-2-N; NASA CR-6.

NASA N63-17316 repriced OTS $0.75

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY XI; ABSOLUTE INTENSITY MEASUREMENTS IN THE VACUUM ULTRAVIOLET, by J. A. R. Samson. Rept. on Contract NASw-395. Mar 63, 28p. 6 refs. GCA-TR-63-3-N; NASA-CR-7.

NASA N63-17318 repriced OTS $0.50

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY XIII: ELECTRON AND ION TEMPERATURE IN THE IONOSPHERE, by A. Dalgarno. Rept. on NASA Contract NASw-701. Apr 63, 20p. 12 refs. GCA-TR-63-11-N; NASA CR-8.

NASA N63-14008 OTS $5.60

Lunar and Planetary Lab., U. of Arizona, Tucson.
COMMUNICATIONS OF THE LUNAR AND PLANETARY LABORATORY, VOLUME I, NUMBERS 14-16, by Barbara Middlehurst and Gerard P. Kuiper. 1962, 57p 28refs
Grant NsG-161-61
Includes NASA N63-14009-14011

BEHAVIORAL SCIENCES

NASA N63-12504 OTS $1.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A FLIGHT STUDY OF THE EFFECTS OF NOISE FILTERING IN THE ATTACK DISPLAY ON THE PILOT'S TRACKING PERFORMANCE, by Howard L. Turner and Donovan R. Heinle. 10 Sep 58, declassified 14 Sep 62. 19p 9refs
Research memo. RM A58E21

BIOLOGICAL SCIENCES

TID-18142 OTS $1.60

Argonne National Lab., Ill.
OPTICAL ROTATORY DISPERSION OF SOME AMINO ACIDS AND CRITERIA OF PROTEIN CONFIGURATION, by Leonard I. Katzin and Elsie Gulyas. Dec 62, 11p 13refs
Contract W31-109-eng-38
UAC-7137

BNL-6004 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
MITOTIC INDICES OF HUMAN BONE MARROW CELLS. II. THE USE OF MITOTIC INDICES FOR ESTIMATION OF THE TIME PARAMETERS OF THE GENERATIVE CYCLE PARTICULARLY IN CATENATED MULTIPLICATIVE COMPARTMENTS, by S. A. Killmann, E. P. Cronkite, T. M. Fliedner, V. P. Bond, and G. Brecher. 23 Apr 62, 38p 8refs
Contract AT(30-2)GEN-16

PB 163 663 OTS $2.60

Kansas State U. Engineering Experiment Station, Manhattan.
A STUDY OF THE FLOW OF BLOOD IN SHEETS. Special rept. no. 26, by J. E. Kipp, R. G. Nevins, C. H. Sprague, R. R. Berns, and C. F. Kittle (Kansas U. School of Medicine). [1962] 29p 9refs
Grant H-5913

DESCRIPTORS: *Blood circulation, *Erythrocytes, *Oxygen equipment, *Mechanical organs, Mechanical properties, Blood pressure, Graphic analysis.

Flow of citrated human blood through a channel eight inches long, four inches wide, and from ten one-thousandths to thirty one-thousandths of an inch thick was studied to obtain reliable data for the prediction of pressure drop in a membrane oxygenator, and to examine the tendency of the red blood cells to accumulate axially in sheet flow. Results are presented graphically in dimensionless terms. (Author)

TID-17958 OTS $15.50

Woods Hole Oceanographic Institution, Mass.
BIOLOGICAL, CHEMICAL AND RADIOCHEMICAL STUDIES OF MARINE PLANKTON. Progress rept. by Bostwick H. Ketchum. 15 Feb 63, 232p 338refs
Contract AT(30-1)1918
Reference no. 63-4

Anatomy and Physiology

LADC-5590 OTS $5.60

Los Alamos Scientific Lab., N. Mex.
THREE-COMPONENT BODY COMPOSITION ANALYSIS BASED ON POTASSIUM AND WATER DETERMINATIONS, by Ernest C. Anderson. 18 Mar 63, 55p. 18refs
Contract W7405-eng-36.

AD-277 200 OTS $5.60

RCA Defense Electronic Products, Camden, N. J.
SPEECH PATTERN RECOGNITION BY SIMULATED NEURAL NETWORKS. Interim rept. no. 1, 1 Dec 61-1 May 62, on Applied Communication Research for Air Force Vehicles, by T. B. Martin and J. J. Talavage. 1 Jul 62, 58p 66refs
Contract AF 33(657)7405
ASD-TDR-62-511

DESCRIPTORS: *Ear, Simulation, *Anatomical models, *Hearing, Nervous system, *Psychoacoustics, Voice communication system, Design, Physiology, Speech, Nerves, Electrical networks, *Speech recognition, Bionics, Pattern recognition.

A summary of knowledge of the physiology of hearing is presented, including information on the middle ear, inner ear, and the intermediate levels up through the acoustic cortex; neural responses from these levels are described. The authors are using this information to guide the design of a speech recognition system using neural networks. Electrical models of the middle ear and the basilar membranes are described. Certain aspects of the performance of the models are compared with known psychoacoustic data on threshold of hearing, masking and critical bandwidth. A "neural transition AND gate" is described which abstracts time transitions of energy as they occur in the speech patterns. (Author)

Botany

TID-17936 OTS $2.60

Michigan State U., East Lansing.
THE UPTAKE AND LOSS OF MATERIALS BY LEAVES AND OTHER ABOVE-GROUND PLANT PARTS WITH SPECIAL REFERENCE TO PLANT NUTRITION, by H. B. Tukey, S. H. Wittwer, and M. J. Bukovac. 1962, 25p 27refs
Contract AT(11-1)888

PB 163 605 OTS $14.00

Chicago U., Ill.
INVESTIGATIONS OF PHYSIOLOGICAL ASPECTS OF PLANT WATER RELATIONS. Rept. no. 14 (Final), 29 Mar 57-31 Aub 60, by Wayne J. McIlrath. [1960] 206p
Contract DA 19-129-qm-915
File no. V-334.

DESCRIPTORS: *Plants (Botany), Beets, *Dehydration, Water, *Absorption, Seeds, Fruits, Tissues (Biology), Freeze drying, Graphic analysis, Statistical data, Physiology.

An investigation was made of a biological dehydration system found in the seeds of tomato. The influence of a number of different factors on the rate and/or final degree of rehydration of dried Swiss chard leaf tissue was investigated. Included among these were methods of drying, size and shpe of leaf fragments, pre-treatment before drying, pH of the rehydration liquid, rate of rehydration, various compounds in the rehydrating liquid including surface-active agents, percentage dry weight of the tissue, and tissue age. Histological studies were made of tissues dried by various methods. Experiments were performed to determine the magnitude of the rehydration forces. The rehydration capacity of various cellular components was determined. The relation of the chemical composition of the tissue to its ability to rehydrate was studied. The rehydration characteristics of tissues dried to various levels was examined. The influence of selected growth regulators on dehydration and rehydration of chard tissues was investigated. (Author)

Radiobiology

TID-18003 OTS $1.10

Columbia U. Coll. of Physicians and Surgeons, New York.
DELAYED EFFECTS OF X-IRRADIATION ON THE CENTRAL NERVOUS SYSTEM OF THE MONKEY. Annual progress rept. 12 Feb 63, 10p
Contract AT(30-1)3014

NP-11454 OTS $26.00

General Atomic Div., General Dynamics Corp., San Diego, Calif.
ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE, Final Safeguards rept. rev. Mar 63, 512p (Prepared in cooperation with Holmes and Narver, Inc.)

HW-SA-2540 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
ANTIBIOTIC RESISTANCE AND RADIATION INDUCED MUTATION IN CHONDROCOCCUS COLUMNARIS, by M. P. Fujihara, P. A. Olson, and F. P. Hungate. 9 May 62, 14p 13refs
Contract AT(45-1)1350.

LF-8 OTS $0.50

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
FLORA OF HEALTHY DOGS. II. ISOLATION OF ENTEROVIRUSES FROM LOWER INTESTINE, by W. E. Clapper and F. F. Pindak. Jun 63, 21p 12refs
Contract AT(29-2)1013

TID-18616 OTS $2.75

Kansas U., Lawrence.
LABORATORY EXPERIMENTS IN RADIATION BIOLOGY, by Edward L. Shaw. Feb 63, 152p 41refs
Contract AT(11-1)1093

TID-18194 OTS $7.60

Marquette U., Milwaukee, Wis.
A STUDY OF THE EFFECTS OF X-IRRADIATION OF EXCLUSIVELY THE CIRCULATING BLOOD ON THE ANTIBODY PRODUCING MECHANISM OF THE RABBIT. Final rept. 1 Oct 59-30 Sep 62, by Peter Abramoff. 78p 100refs
Contract AT(11-1)820

TID-18139 OTS $2.60

Michigan U., Ann Arbor.
EFFECTS OF RADIATION ON THE DEVELOPING NERVOUS SYSTEM, by Samuel P. Hicks. Jan 63, 24p 28refs
Contract AT(11-1)1201

TID-17911 OTS $1.10

New York State U. Research Foundation, Albany.
RADIOAUTOGRAPHIC, HISTOCHEMICAL, AND BIOCHEMICAL STUDIES OF THE EFFECTS OF IRRADIATION ON CARTILAGE AND BONE. Progress rept, 15 Feb 62-1 Jan 63, by Albert Hirschman. 7p
Contract AT(30-1)2960

TID-12729 OTS $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
CORRELATION OF URANIUM ALPHA SURFACE CONTAMINATION, AIR-BORNE CONCENTRATIONS, AND URINARY EXCRETION RATES, by N. B. Schultz and A. F. Becher. [1961] 15p 4refs
Contract W7405-eng-26

NYO-10451 OTS $3.00

Radiological Research Lab., Columbia U., New York.
RESEARCH PROJECT. Annual rept. 1 Jan 63, 198p 24refs
Contract AT(30-1)2740

BNL-6773 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
HOT-ATOM CHEMISTRY OF THE SOLID STATE; ITS HISTORY, CURRENT STATUS AND FUTURE PROSPECTS VIEWED IN RELATION TO THE PLANNING OF CHEMICAL RESEARCH PROGRAMS FOR NEW SCIENTIFIC ESTABLISHMENTS CENTERED ABOUT A RESEARCH REACTOR, by Garman Harbottle. 1963, 34p 108refs
Contract AT(30-2)GEN-16

TID-17275 OTS $3.60

Utah U., Salt Lake City.
THEORETICAL STUDIES ON LIQUID COOLANTS. Status rept. no. 1, 28 Jan 61-31 Jan 62, by Takashi Nakamura, Sook-il Kwun, Taikyue Ree, and Henry Eyring, 31p 40 refs
Contract AT(10-1)1076

Analytical Chemistry

NAA-SR-7918 OTS $0.50

Atomics International, Canoga Park, Calif.
DETERMINATION OF CARBON IN SODIUM BY ISOTOPE DILUTION MASS SPECTROMETRY, by K. Y. Eng, C. D. Bingham, and R. A. Meyer. 30 Jun 63, 23p 6refs
Contract AT(11-1)GEN-8

LA-2892 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
THE TITRIMETRIC DETERMINATION OF TRACES OF NITRIDE NITROGEN IN SODIUM METAL, by C. H. Ward, R. D. Gardner, W. H. Ashley, and A. Zerwekh. Apr 63, 11p 4refs
Contract W7405-eng-36

MCW-1480 OTS $0.50

Mallinckrodt Chemical Works, Weldon Spring, Mo.
PROCESS DEVELOPMENT QUARTERLY PROGRESS REPORT, JANUARY-MARCH 1963. 1 May 63, 27p 13refs
Contract W14-108-eng-8

NDA-2154-5 OTS $1.60

United Nuclear Corp., White Plains, N. Y.
EXPERIMENTAL DETERMINATION OF CONTAMINANTS IN SODIUM. Quarterly progress rept. for 1 Jan-31 Mar 61, by H. Steinmetz. 1 May 61, 12p 4refs
Contract AT(30-1)2303

Organic Chemistry

IS-628 OTS $8.10

Ames Lab., Iowa State U. of Science and Tech.
THE CRYSTAL STRUCTURE OF BIS(META-CHLOROBENZOYL) METHANE, by Gordon Roy Engebretson and R. E. Rundle. Nov 62, 87p 60refs
Contract W7405-eng-82

NASA N63-19786 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SOIL ORGANIC MATTER, by R. E. Cameron and G. B. Bland. 23 May 63, 17p 25refs
Contract NAS7-100
Technical rept. no. 32-443; NASA CR-50778

NLCO-882 OTS $0.75

National Lead Co. of Ohio, Cincinnati.
REMOVAL OF FOREIGN ORGANIC MATERIALS FROM TBP-KEROSENE SOLVENT, by N. R. Leist and J. H. Krekeler. 25 Jun 63, 29p 19refs
Contract AT(30-1)1156

Physical Chemistry

ANL-6657 OTS $1.50

Argonne National Lab., Ill.
A STUDY OF THE THERMODYNAMIC PROPERTIES OF THE VANADIUM-IRON ALLOY SYSTEM, by Kevin Michael Myles. Feb 63, 59p 81refs
Contract W31-109-eng-38.

AD-410 396 repriced OTS $1.00

Brussels Free U. (Belgium)
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES. PART X. THE DISSOCIATION ENERGY OF THE GROUP IV-GROUP VI MOLECULES. Final rept. by R. Colin and J. Droward. May 63, 32p
Contract AF 61(052)225
WADD TR-60-782, pt. 10; NASA N63-17940

DESCRIPTORS: *Chemical compounds, Dissociation, *Molecules, Carbon compounds, Silicon compounds, Germanium compounds, Tin compounds, Lead compounds, Oxides, Sulfides, Tellurides, Selenides, Group IV elements, Group V elements, Group V elements, Group VI elements, Spectroscopy, Thermochemistry, Vapors, Heat of formation, Heat of sublimation, Vapor pressure, Alloys

The available spectroscopic and thermochemical data for the dissociation energy of the group IV-group VI MeX molecules are reviewed and the best present values proposed. Correlations of several excited molecular states with atomic products are proposed. (Author)

TID-15615 OTS $2.60

California U., Los Angeles.
REMARKS ON THE HEAT TRANSPORT IN HELIUM II AT HIGH FLUX VALUES, by T. H. K. Frederking. Feb 62, 30p 38refs
Contract AT(11-1)34
Rept. 62-5

TID-18149 OTS $2.60

Chicago U., Ill.
POLAROGRAPHIC OXIDATION POTENTIALS OF AROMATIC COMPOUNDS, by E. S. Pysh and N. C. Yang. 1962, 30p 31refs
Contract AT(11-1)1043

PB 163 367 OTS $5.60

Electrochemistry Lab., U. of Pennsylvania, Philadelphia.
STUDIES OF THE FUNDAMENTAL CHEMISTRY PROPERTIES AND BEHAVIOR OF FUEL CELLS. Semi-Annual progress rept. no. 1, 1 Oct 62-31 Mar 63, by J. O'M. Bockris. [1963] 58p 8refs
Grant NsG 325.

DESCRIPTORS: *Fuel cells, *Electrochemistry, Electric potential, *Electrodes, Gold, Platinum electrodes, *Naphthalenes, *Ethylenes, *Catalysts, Adsorption, Thin films, Reaction kinetics, Porous materials.

Contents:
Potentials of zero charge
Deactivation of catalysts: Adsorption
Nature of catalysts
Mechanism of electro-catalysis
Studies of the mechanism of porous electrodes
The theory of electric double layers.

TID-18196 OTS $5.60

Fordham U., New York.
THE THERMODYNAMICS AND KINETICS OF COORDINATION COMPOUNDS. Progress rept. by Michael Cefola and Philip S. Gentile. 11 Mar 63, 55p 87refs
Contract AT(30-1)906

NASA N63-18048 OTS $5.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
INVESTIGATIONS OF CARBIDES AS CATHODES FOR THERMIONIC SPACE REACTORS. Quarterly progress rept. for the period ending 28 Feb 62, by A. F. Weinberg, R. G. Hudson, B. Siefner, and L. Yang. [1962] 56p 5refs
Contract NAS5-1253
GA-3007

LA-2841 OTS $2.25

Los Alamos Scientific Lab., N. Mex.
HEATS OF DISSOCIATION OF GASEOUS CHLORIDES, by R. C. Feber. 24 May 63, 100p 270refs
Contract W7405-eng-36.

TID-18200 OTS $1.10

Purdue U., Lafayette, Ind.
HYDROGEN FLUORIDE SOLVENT SOLUTION. XII. PROTON MAGNETIC RESONANCE OF THE WATER-HYDROGEN FLUORIDE SYSTEM, by A. F. Clifford and M. D. Campbell. 1961, 10p 11refs
Contract AT(11-1)620

PB 163 507 OTS $2.60

TYCO Labs., Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES. Final technical summary rept., 15 May 61-27 Mar 62, by A. I. Mlavsky. 27 Apr 62, 23p 23refs
Contract NObs-84770; ARPA Order no. 204-61

DESCRIPTORS: *Fuel cells, *Electrodes, *Electrochemistry, *Intermetallic compounds, *Atomic orbitals, *Nickel electrodes, Nickel compounds, Oxides, Sulfides, Arsenides, Antimonides, Silicides, Nitrogen, Oxygen, Hydrogen, Perchlorates, *Palladium, Oxidation, Permeability, Porous materials, Carbon.

In an attempt to correlate electrode behavior with the electronic properties of electrode materials with incompletely occupied d-orbitals, a number of intermetallic compounds containing nickel together with an electronegative element from groups IV-B, V-B, and VI-B of periodic tables, have been synthesized and evaluated as electrode materials. NiO, NiS, NiAs, NiSb, NiSi and elemental nickel in the massive form have been studied in N_2, O_2 and H_2 atmospheres in both alkaline and acid perchlorate media. Anodic and cathodic polarization measurements were made. Polarization has been pronounced at moderate current densities. Participation of O_2 and H_2 has been poor and the corrosion reactions have been prominent. The cathodic hydrogen evolution reaction on these electrodes is discussed. The use of palladium as a support material for quick permeation of hydrogen and avoiding the three-phase interface problem is discussed. Results of the effect of various treatment of the palladium surface on the permeation of hydrogen are presented and discussed. (Author)

TID-18137 OTS $2.60

Wisconsin U., Madison.
STUDY OF POLARIZATION FROM REACTIONS, by W. Haeberli. 1963, 28p 47refs
Contract AT(11-1)GEN-7

EARTH SCIENCES

PB 163 661 OTS $2.60

Army [Cold Regions Research and Engineering Lab., Hanover, N. H.]
STRENGTH DATA ON LAKE ICE. PART II, by Guenther E. Frankenstein. Jan 61, 21p 2refs
Technical rept. 80

DESCRIPTORS: *Lake, *Ice, *Beams(Structural), Mechanical properties, Tests, Experimental data, Analysis, Michigan, Cantilever beams.

Results are reported of 245 in-place supported beam tests and 56 in-place cantilever beam tests conducted during the 1957-58 winter on clear ice and a combination of clear and snow-ice from Chassel and Keweenaw Bays (Mich.) The supported beams had a higher computed flexural strength than similar cantilever beams. The flexural strength of the supported beams with the surface layer in tension was always higher than the supported beams with the bottom layer in tension. As reported earlier, the flexural strength of cantilever beam tests was highest when the bottom layer was in tension. On a clear day with air and ice temperatures near 0C, ice strength will decrease by as much as 6 times from morning to mid-aft. The testing equipment is illustrated, summary data are tabulated and graphed, and results of individual tests are appended. (Author)(See also PB 149 124)

PB 163 657 OTS $3.60

[Enrico Fermi] Inst. for Nuclear Studies, U. of Chicago, Ill.
RESEARCH TO ASSAY RAIN AND SURFACE WATER FOR NATURAL TRITIUM CONTENT. Final rept. by W. F. Libby. 1 Jun 54, 32p 12refs
Contract AF 18(600)564
OSR-TN-54-142; AD-34 458

DESCRIPTORS: *Geochemistry, *Hydrology, *Meteorology, Water, *Atmospheric precipitation, *Rainfall, *Sea water, *Rivers, *Lakes, *Water supplies, *Wines, *Natural radioactivity, Radioactive isotopes, *Tritium, Radioactivation analysis, Radiation measuring systems

The method used for the quantitative measurement of tritium in natural waters consisted of (1) electrolytic concentration of water samples, (2) measurement of the deuterium concentration in the final product, and (3) determination of the tritium content of the concentrate by placing it as gaseous H in a Geiger counter. The results obtained are expressed as units of the number of tritium atoms/10^{18} H atoms present in the original sample. The data obtained were in accord with an average cosmic-ray production rate of about 0.14 tritium/sq cm/sec. Essentially, all of this tritium is passing into water without decaying into He, and the tritiated water is rained out and goes into the sea. The average tirtium content of oceanic rain appeared to be about 1; the continental rains have higher assays. The Mississippi Valley shows about 6, and the western coast of Europe shows about 2.5. Changes in the natural tritium manufacturing rate are discussed in relation to old-water examinatiou. Accumulation of He^3 in the atmosphere from the decay of cosmic-ray tritium indicated that He must leave the earth in a time not in excess of about 50,000,000 yr. (DDC abstract)

PB 163 363 OTS $5.60

Hawaii Inst. of Geophysics, Honolulu.
ENERGY EXCHANGE IN THE NORTH PACIFIC; ITS RELATIONS TO WEATHER AND ITS OCEANOGRAPHIC CONSEQUENCES. PART III: DAILY HEAT EXCHANGE IN THE NORTH PACIFIC IN DIFFERENT SEASONS; OCEANOGRAPHIC CONSEQUENCES AND RELATIONS TO WEATHER. Interim rept. no. 3, by T. Laevastu. May 63, 51p 11refs
Grant NSF-GP-353
Rept. no. 31 (Rev.)

DESCRIPTORS: *Thermal radiation, Periodic variations, *Pacific Ocean, *Climatology, *Marine meteorology, *Oceanology, Heat transfer, Evaporation, Condensation, Wind, Storms, Sea water, *Maps.

The following are the main preliminary findings which suggest themselves from a hasty analysis of the heat exchange charts, all of which however need further and more detailed study on a larger number of heat exchange charts: A remarkably high loss of heat from the sea is found on February 15, 1957, along the Asian coast and in an area between ca. 17° to 35°N and 150° to 160°E. The comparison of the charts of Q_a (the sum of latent heat and sensible heat transfer) with the weather maps shows that the patterns of this heat exchange component are greatly determined by the direction of winds in relation to sea surface isotherms. The dissipation of North Pacific lows occurs over areas where no sharp Q_a gradients exist. The air temperature seems to respond relatively rapidly to the temperature of the sea surface over which it is moving.

NASA N63-11881 OTS $8.60

Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
INFRARED FLUX AND SURFACE TEMPERATURE DETERMINATIONS FROM TIROS RADIOMETER MEASUREMENTS, by D. Q. Wark, G. Yamamoto, and J. Lienesch. Aug 62, 100p 32refs
Rept. no. 10

NASA N63-19857 OTS $6.60

Rand Corp., Santa Monica, Calif.
INTEGRAL AND SPHERICAL-HARMONIC ANALYSES OF THE GEOMAGNETIC FIELD FOR 1955.0, by E. H. Vestine and W. L. Sibley. Jun 63, 69p 23refs
Contract NASr-21(05)
Memo no. RM-3684-NASA; NASA CR-50609

SC-4903 (RR) OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
HUGONIOT DATA FOR SOME GEOLOGIC MATERIALS, by R. C. Bass, H. L. Hawk, and A. J. Chabai. Jun 63, 18p 9refs
Contract AT(29-1)789

Oceanography

PB 163 312 OTS $2.60

Texas A. and M. Coll., College Station.
R/V ALAMINOS, DESIGN CONCEPT. Progress report by Hugh J. McLellan, Robert E. Stevenson, and Robert E. Schuller. [1962] 27p
Grant G-22387
Ref. no. 62-9T

DESCRIPTORS: *Oceanographic vessels, Design.

Progress is reported on the acquisition and outfitting of a 180-foot vessel for oceanographic research.

PB 163 452 OTS $6.60

Texas A. and M. Coll., College Station.
STUDY OF PRIMARY PRODUCTIVITY IN DRAKE PASSAGE (SOUTHERN OCEAN). Semi-annual rept., 1 Nov 62-30 Apr 63, by Sayed Z. El-Sayed, 14 Jun 63, 62p
Grant G-21444

DESCRIPTORS: *Oceanology, *Oceans, *Oceanographic data, Oceanographic vessels, Scientific personnel, Physical properties, Chemical properties, *Marine biology, Chlorophylls, Analysis, Antarctic regions.

The purpose of this report is to summarize all the physical, chemical, and biological data obtained during the last two cruises aboard the ARA/Zapiola and ARA/Capitan Canepa to the Drake Passage and Antarcti peninsula. The cruise aboard the Zapiola lasted from December 20, 1962 to January 23, 1963. The other aboard the Capitan Canepa was between February 15 to March 20, 1963. The main objective of these two cruises was to study primary production in the following areas: (a) Drake Passage; (b) Bransfield Strait. (Author)

Physics of the Atmosphere

PB 163 665 OTS $4.60

Arctic, Desert, Tropic Information Center, Air U., Maxwell AFB, Ala.
INVESTIGATION OF ATMOSPHERIC REFRACTION AT LOW ALTITUDES, by Kaj G. Strand. Feb 53, 46p 7refs
ADTIC Publication no. A-102; AD-6452

DESCRIPTORS: *Atmospheric refraction, Measurement Photographic analysis, Barometric pressure, Atmospheric pressure, *Moon, *Stars, *Tables

Observations were made of the moon and of the Pleiades at the Dearborn Observatory located on the western shore of Lake Michigan to obtain data on atmospheric refraction at low altitudes. Tabulated data are included for the exposure time and emulsion speed of the plates, the true altitude, the rate of change of refraction in arc seconds for each minute of arc change in the true altitude ($\Delta r/1'$), the probable error of $\Delta r/1'$, the number of observations used in determining $\Delta r/1'$, the observed value of $\Delta r/1'$ reduced to standard conditions according to the refraction tables in Astronomisch-Geodatisches Jahrbuch (1952), and the computed refraction derived from the same source for the true altitude. The general results indicated no serious error in the refraction tables in Astronomisch-Geodatisches Jahrbuch. However, results obtained from temperature and pressure-corrected observations of individual nights showed that the observed values may differ by as much as 8% from the computed values. This result indicated that the existing correction tables need revision. (DDC abstract)

NYO-9675 OTS $6.60

Del Electronics Corp., Mount Vernon, N. Y.
STRATOSPHERIC MONITORING PROGRAM. Summary progress rept. Feb 61-Apr 62, by M. Lippmann. 10 Sep 62, 63p 4refs
Contract AT(30-1)2363

NASA N63-19605 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
MASS SPECTROMETRIC INVESTIGATIONS OF THE ATMOSPHERE BETWEEN 100 AND 227 KILOMETERS ABOVE WALLOPS ISLAND, VIRGINIA, by Edith Meadows-Reed and Charles R. Smith. Aug 63, 18p 23refs
NASA TN D-1851 supersedes NASA N62-12463

NASA N63-13280 OTS $9.10

High Altitude Engineering Lab., U. of Michigan, Ann Arbor.
ATMOSPHERIC SOUNDING BY SATELLITE MEASUREMENTS OF STELLAR REFRACTION. Technical rept. by F. F. Fischbach, M. E. Graves, P. B. Hays, G. S. Klein, and C. M. Mizgala. Dec 62, 110p 23refs
Contract NASw-140
Rept 04963-2-T

ENGINEERING

XDC-61-3-66 OTS $12.00

General Electric Co., Burlington, Vt.
FINAL PROGRAM REPORT FOR A HIGH TEMPERATURE, REMOTELY HANDLEABLE CABLING SYSTEM, by G. A. Gallant. 22 Aug 60, 168p
Contracts AF 33(600)38062 and AT(11-1)171

HW-61840 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
SURVEY OF AIR AND GAS CLEANING OPERATIONS, by A. C. Morgenthaler. 1 Sep 59, 22p
Contract AT(45-1)1350

PNE-112F(Pt. I) OTS $1.25

Lawrence Radiation Lab., U. of California, Livermore.
SHOCK INDUCED TRANSITIONS. PART I. SAMPLE HISTORY AND SAMPLE RECOVERY, Rept. on Proj. GNOME, by M. W. Nathans and A. Holzer. 1 Feb 63, 45p
Contract W7405-eng-48

TID-16739 OTS $3.60

Sandia Corp., Albuquerque, N. Mex.
CRATERING EXPERIMENTS WITH LARGE HIGH EXPLOSIVE CHARGES by L. J. Vortman. 25 Sep 62, 34p 12refs.
Contract AT(29-1)789.
SCDC-2846.

TID-18074 OTS $3.60

Texas U., Austin, Tex.
FEASIBILITY OF CREATING SPHERICAL CAVITIES IN UNDERGROUND SALT DOMES. Progress rept. Dec 62-Jan 63. 35p
Contract AT(29-2)1051

Aeronautical Engineering

AD-291 981 OTS $1.60

Aeronautical Structural Lab., Naval Air Material Center, Philadelphia, Pa.
REQUIREMENTS FOR HIGH-TEMPERATURE STRAIN GAGES IN STRUCTURAL TESTING, by R. J. Molella and C. R. Nelson. 18 Jul 62, 18p 45refs
Rept. no. ASL(14)R360FR101

DESCRIPTORS: *Strain gages, *High temperature research, Transducers, Test methods.

This report restates the need for a suitable high-temperature (up to 2,000°F) strain gage for use in conjunction with flight and laboratory investigations of future hypersonic vehicles and missiles. Strain-gage general information and requirements are documented with the hope that a fresh look will provide the stimulus for a major state-of-the-art advance.

PB 163 664 OTS $1.60

Battelle Memorial Inst., Columbus, Ohio.
FORMAL DEFINITIONS OF RELIABILITY. Special rept. by D. E. Debeau, G. Kuhn, and W. L. Swager. 20 May 57, 16p
Contract AF 33(616)3344
AD-133 094

DESCRIPTORS: *Reliability, Propellers, Hazards, Control systems.

Reliability and related concepts such as failure rate, hazard rate, probability of survival, relationships, and mean time to failure are defined. Specific failure patterns result from the constant hazard rate, the Gaussian failure rate, the infant mortality rate, and a typical hazard rate. Reliability theory is applied to propeller-control systems; catastrophic reliability, emergency reliability, field maintenance reliability, and depot maintenance reliability. (DDC abstract)

PB 163 356 OTS $6.60

Bendix Products Div., Bendix Corp., South Bend, Ind.
FLEXIBLE MANDREL: DESIGN - FABRICATION - TEST, by Roy M. Palmer and James A. Tankersley. May 60, 70p 2refs
Contract AF 33(600)34816
WADD Technical rept. 60-183; AD-240 752

DESCRIPTORS: *Landing gear, *Mandrels, Design, *Axle shafts, *Mounting brackets, *Hydraulic brakes, Flexible shafts, Aircraft equipment, Test equipment, Dynamics, Stresses.

A flexible mandrel (simulator) was designed to provide a means of mounting aircraft brakes, during tests on the large carriage of an 84-in. brake testing machine in simulating the flexibility of the landing gear and other aircraft structure of an actual airplane. An F-106 axle, wheel, brake, and tire assembly was used in preliminary tests. Brake stops were made at speeds and brake pressures normally believed to induce the most severe forcing functions into the simulator. Demonstration tests were performed which proved the structural integrity and dynamic response of the equipment. The mandrel was installed on the application arm of the 84-in. dynamometer, and the test wheel, brake, and tire assembly was mounted on the mandrel. The effectiveness of the mandrel for use in chatter studies was tested.

NASA N63-19967 OTS $9.10

Southern Research Inst., Birmingham, Ala.
PROTECTIVE COATINGS FOR SHEET METALS IN SUPERSONIC TRANSPORT AIRCRAFT. Final summary rept., 1 Jun 62-31 May 63, by Sidney G. Holder, Jr. and A. Clyde Willhelm. 15 Jun 63, 107p 42refs
Contract NASr-117
Rept. no. 5957-1417-IV; NASA CR-50824

Chemical Engineering

PB 181 545 OTS $2.25

Fluor, Singmaster, and Breyer, Inc., New York.
ABSORPTION MULTISTAGE FLASH DISTILLATION PROCESS. Rept. on Contract 14-01-001-305. Sep 63, 86p. 37 refs. Saline Water Research and Development progress rept. no. 81.

DESCRIPTORS: *Sea water, *Desalination, *Distilling plants, Design, Effectiveness, *Absorbents, *Sodium compounds, Hydroxides, *Lithium compounds, Bromides, Solutions, Vapor pressure, Enthalpy, Density, Viscosity, Costs

The development study of the Sherwood Absorption Multistage Flash Evaporator Process confirms that a high thermal efficiency and economy can be realized by generating high pressure steam for production of power needed for pumping and other services in the distillation

plant and subsequently using the exhaust steam from the power equipment at an intermediate pressure level for the absorption cycle heat requirements. In the application of the solution cycle to multistage flash evaporation, the thermal performance can be improved by transferring the heat of dilution of the absorber system directly to the evaporator recycle brine without first generating low-pressure heating steam.

ORNL-3418 OTS $1.50

Oak Ridge National Lab., Tenn.
AQUEOUS PROCESSING OF THORIUM FUELS, PART II, by R. E. Blanco, L. M. Ferris, C. D. Watson, and R. H. Rainey. 1963, 55p 52refs
Contract W7405-eng-26

ORNL-3404 OTS $2.00

Oak Ridge National Lab., Tenn.
DEMONSTRATION OF THE ZIRFLEX AND SULFEX DECLADDING PROCESSES AND A MODIFIED PUREX SOLVENT EXTRACTION PROCESS, USING IRRADIATED ZIRCALOY-2 AND STAINLESS-STEEL-CLAD URANIA SPECIMENS, by J. H. Goode, M. G. Baillie, and J. W. Ullmann. 1962, 79p 58refs
Contract W7405-eng-26.

PB 181 546 OTS $1.75

Office of Saline Water, Washington, D. C.
CONVERSION OF SALINE WATER. A BIBLIOGRAPHY OF LITERATURE RESULTING FROM THE ACTIVITIES SPONSORED BY THE OFFICE OF SALINE WATER, comp. by Karel A. Kase. Oct 63, 64p. 367 refs. Saline Water Research and Development progress rept. no. 82.

DESCRIPTORS: *Sea water, *Desalination, Reports, Conferences, *Bibliographies

This publication is a bibliography of those monographs, scientific and technical reports, papers and periodical articles which are a result of the activities of the Office of Saline Waters or which were written by a staff member of that Office. The bibliography which is arranged by author, is divided in two parts: I. Articles and Monographs, II. Reports, and is supplemented by author and subject indexes.

PB 181 544 OTS $2.25

Southern Research Inst., Birmingham, Ala.
DEMINERALIZATION BY TRANSPORT DEPLETION, by Robert E. Lacey. Rept. on Contract 14-01-001-229. Nov 63, 93p. 19 refs. Saline Water Research and Development progress rept. no. 80.

DESCRIPTORS: *Sea water, *Desalination, Towers (Chemistry), *Electrodialysis, *Ion exchange, Membranes (Mechanics), *Plastic films, Thickness, Resistance (Electrical), Transport properties, Diffusion, Fluid flow, Osmotic pressure, Additives, Amines, Methyl radicals, Polymers, Cellulose acetate, Colloids, Separation, Electrophoresis, Economics, Costs.

Appreciable demineralization was shown to occur in the transport depletion process. A new type of sleeve construction was developed that overcomes the disadvantage of the stagnant liquid layers between membranes and sleeves in the original design for a transport depletion demineralizer, while retaining the advantages of sleeve construction, almost 100% membrane utilization and lower-cost construction by elimination of heavy clamping frames. Theoretical expressions were developed which described demineralization performance, but which did not adequately account for all the transport phenomena observed. Performance was shown to be influenced by the film properties of transference number, electrolyte diffusion rate, and osmotic water transfer rate, as well as by other unidentified factors. Cost estimates indicated that for many feed waters the transport depletion process will be less costly than electrodialysis, even if the coulomb efficiency of transport depletion is not improved over the 55% achieved experimentally to date. The efficiency should be increased and the cost reduced by further understanding of the theoretical basis of the transport and by the development of films containing fewer fixed charges.

PB 181 543 OTS $1.25

Whirlpool Corp., St. Joseph, Mich.
RESEARCH ON THERMOELECTRIC HEAT PUMPS, by E. F. Cox. Rept. on Contract 14-01-001-256. Nov 63, 41p. Saline Water Research and Development progress rept. no. 76.

DESCRIPTORS: *Sea water, *Desalination, *Distilling plants, *Refrigeration systems, *Energy conversion, *Thermoelectric convertors, Theory, *Peltier effect, *Semiconductor devices, Construction, *Thin films, Plating, Vapor plating, Hydrolysis, *Sputtering, Tellurium, Antimony, Pumps.

In theory at least, Peltier thermal pumping appears quite promising as a means of improving efficiency of distillation processes. With further research the possibility of constructing good Peltier thermal pumps with very small amounts of semiconductor materials may be proven. This will reduce capital investment required for a Peltier still to a value where the OSW and others could afford to be interested.

Electrical and Electronic Engineering

PB 163 673 OTS $5.60

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V.T. FUZES. Quarterly rept. no. 1, 21 Nov 53-20 Feb 54, by Robert J. Dew, Jr. and Karl E. Nelson. [1954] 54p 62refs
Contract DA 33-008-ORD-862
AD-44 236

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, *Barium compounds, *Titanates, *Material forming, Machining, Casting, Extrusion, Heat treatment, *Aging (Materials)

The object of this project is to investigate the effect of process variables and conditions of use on capacitance change with time of ceramic dielectrics of relatively high dielectric constant. This phenomenon is referred to as 'aging'. During the period of this report the litera ture survey has been nearly completed. Investigations of the effect of forming methods, geometrical shape, composition, and firing conditions have been started. The data obtained are not yet sufficient to be conclusive. (Author abstract) (See also PB 163 667)

PB 163 666 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES.
Monthly progress rept. no. 1, 21 Nov-20 Dec 53, by Robert J. Dew, Jr. 24 Dec 53, 8p
Contract DA 33-008-ORD-862
AD-44 232

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure.

Investigation will be limited to bodies which have dielectric constants (K's) between 750 and 2000, capacitance deviations of less than 10% from -60° to 165°F, and power losses no greater than 1%. Studies will be made of the processing, manufacture, and assembly of ceramic capacitator materials used in VT fuzes. (DDC abstract) (See also AD-44 100)

PB 163 667 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES.
Monthly progress rept. no. 2, 21 Dec 53-20 Jan 54, by Robert J. Dew, Jr. 4 Feb 54, 5p
Contract DA 33-008-ORD-862
AD-44 233

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, *Barium compounds, *Titanates, *Aging (Materials).

Initial data on one composition indicates a lower aging is obtained with pure barium titanate than commercial grade material. An appreciably higher dielectric constant was also obtained. Using a special lot of commercial grade barium titanate known to have good characteristics samples and were prepared electrical tests made on them to determine the possible effect of the following on aging: (1) Forming method: casting, pressing and extruding (2) Variation of pressure on dry pressing method of forming (3) Effect of thickness to silver area ratio. (See also PB 163 666)

PB 163 674 OTS $7.60

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES.
Quarterly rept. no. 2, 21 Feb-20 May 54, by Robert J. Dew, Jr. and Karl E. Nelson. 23 Jul 54, 76p 15refs
Contract DA 33-008-ORD-862
AD-44 237

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, Microstructure, X-ray diffraction analysis, *Barium compounds, *Titanates, *Material forming, Machining, Casting, Extrusion, Heat treatment, Thermal stresses, *Aging (Materials), Impurities, Silver.

The different process variables encountered in the fabrication of a silvered ceramic dielectric have been investigated with respect to their effect on the aging characteristic. It has been concluded that none of these have as significant an effect on aging as the effect of composition or the state of the raw materials used in the compositions. Ceramic dielectrics that do age very sensitive to sudden small temperature changes. They may be de-aged several precent by a 10°F. change over a period of fifteen minutes. (Author's abstract) (See also PB 163 669)

PB 163 675 OTS $5.60

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGE IN CERAMIC BODIES FOR USE IN V. T. FUZES.
Quarterly rept. no. 3, 21 May-20 Aug 54, by Karl E. Nelson. 23 Aug 54, 56p
Contract DA 33-008-ORD-862
AD-41 900

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, Microstructure, X-ray diffraction analysis, *Barium compounds, Titanates, *Bismuth compounds, *Stannates, Heat treatment, Thermal stresses, *Aging (Materials).

Investigations have established the fact that the manner in which barium titanate is prepared influences the rate of aging when substituted for one another in the same composition. When chemically pure barium titanate formed by a chemical precipitation process is substituted for a commercial grade material in a ceramic dielectric composition, composed chiefly of $BaTiO_3$ modified by bismuth stannate, the absolute value of aging at the end of 1000 hours is reduced from 5.6 to less than .2%. X-ray investigations show a cubic crystalline structure for the composition containing pure $BaTiO_3$ and a non-cubic structure for the other. Subsequent investigations have revealed that this same non-aging composition can be produced from commercial grade raw materials as well as from chemically pure materials upon proper treatment of the body constituents by a special calcination process. It has been concluded that no simple correlation, if any, exists between crystal size and aging rate for ceramic dielectrics, at least for crystals greater than 1/4 micron. (Author abstract) (See also PB 163 671)

PB 163 676 OTS $4.60

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGE IN CERAMIC BODIES FOR USE IN V. T. FUZES.
Quarterly rept. no. 4, 21 Aug-20 Nov 54, by Karl E. Nelson. 6 Jan 55, 45p 9refs
Contract DA 33-008-ORD-862
AD-47 163

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, Microstructure, X-ray diffraction analysis, *Barium compounds, Titanates, *Zirconium compounds, *Titanium compounds, Oxides, *Bismuth compounds, *Magnesium compounds, Stannates, *Lead compounds, *Zirconates, *Carbonates, Heat treatment, Calcination, Thermal stresses.

Investigation concerned the effect of certain additions upon the T/C (temperature-capacitance) and aging characteristics of nonaging ceramic dielectrics made from T-154 calcine. Cubic structures, which are nonaging, were obtained by calcinating BaO-TiO_2-$Bi_2(SnO_3)_3$ together prior to firing. Noncubic structures which are aging, were obtained by using commercial $BaTiO_3$ and $Bi_2(SnO_3)_3$. $BaCO_3$ could be successfully substituted for BaO in the T-154 composition. The room-temperature dielectric constant of the body was 1000 to 1200. Electron micrograph studies indicated that the same size and shape crystal existed under the surface of the bodies. The composition A-14 (BaO-TiO_2-$MgSnO_3$) had an aging rate greater than 10% per decade of time between 1 and 100 hr, which was more than double that of commercial $BaTiO_3$. The aging rate diminished slowly at the end of 100 hr, at which time the dielectric constant of the material had aged 23%. (See also PB 163 672)

PB 163 670 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES.
Monthly progress rept. no. 7, 21 May-20 Jun 54, by Robert J. Dew, Jr. and Karl E. Nelson. 22 Jun 54, 5p
Contract DA 33-008-ORD-862
AD-44 100

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, *Barium compounds, *Titanates, *Aging (Materials), Heat treatment.

Data at the end of 200 hours indicate that both overfired and underfired pure barium titanate have aging rates which are greater than the aging rate of correctly fired material. Pure barium titanate fired to complete denseness aged 3% at the end of 200 hours, the overfired 5%, and the underfired 4%. Rapid firing technique, used in an attempt to control and vary crystal size, have produced fired samples of commercial barium titanate which have aging rates as low as the correctly fired pure barium titanate. At the present time, one sample has been made which aged only 2% at the end of 200 hours, while others, fired on different schedules are within the range of 3 to 7%. An aging value of 12% at the end of 200 hours can be expected from commercial barium titanate fired in the normal manner. (See also PB 163 674)

PB 163 671 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES. Monthly progress rept. no. 8, 21 Jun-20 Jul 54, by Karl E. Nelson.
27 Jul 54, 6p
Contract DA 33-008-ORD-862
AD-44 231

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, *Barium compounds, *Titanates, *Aging (Materials), Heat treatment.

Temperature cycling was conducted on T-154-B ($Bi_2(SnO_3)_3$-$Ba\ TiO_3$) and T-153-M (commercial $BaTiO_3$) calcines below and above the Curie temperature. The cycling had no significant effect on the rate of aging at the end of 1000 hr. Samples of CP-grade $BaTiO_3$ were underfired at 2340°F, correctly fired at 2372°F, and overfired at 2410° and 2430°F for 30 min at a rate of 500°F/hr. At the end of 1000 hr, the samples had aged between 3 and 5 1/2%. The underfired and overfired samples had the highest aging values. X-ray data at room temperature indicated that T-154-B is cubic and T-154-6 (both compositions are of $Bi_2(SnO_3)_3$-$BaTiO_3$) is noncubic. Electron micrograph pictures showed no significant difference between the crystal size of the compositions (1/4 to 2μ). At the end of 1000 hr, rapid-fired samples of commercial $BaTiO_3$ held at 1375°C for 2 to 10 min were aged from 3 to 10%. At the end of 200 hr of rapid firing, the aging curves for samples of $BaTiO_3$ held at 1375°C for 2 to 60 min followed that obtained on material fired in the conventional manner. At the end of 500 hr, rapid-fired samples of T-154-6 had a spread of 7 to 9% as compared to 5% for conventionally fired material. (See also PB 163 670)

PB 163 668 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES. Monthly progress rept. no. 4, 21 Feb-20 Mar 54, by Robert J. Dew, Jr. 31 Mar 54, 6p
Contract DA 33-008-ORD-862
AD-44 234

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, *Barium compounds, *Titanates, *Aging (Materials), Impurities, Iron, Heat treatment

Samples of Body T-153-M have been fired at the various schedules: These have been silvered and aging measurements started. Compositions of T-153-M containing less than 0.5% impurity additions have been pre-

pared using twenty-four different impurity materials. These have been fired, silvered and aging measurements started on them. Compositions with different iron contents have been prepared, fired, silvered and aging measurements started. At the end of four hundred hours there does not seem to be any significant difference in the aging with respect to iron content. (See also PB 163 673)

PB 163 669 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES. Monthly progress rept. no. 5, 21 Mar-20 Apr 54, by Robert J. Dew, Jr. 5 May 54, 6p
Contract DA 33-008-ORD-862
AD-44 235

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, *Barium compounds, *Titanates, *Stannates, *Aging (Materials), Impurities, Iron, Silver, Heat treatment.

Data at the end of 540 hours indicate that a slow firing cycle is beneficial in reducing the aging of T-153-M. Soaking time at maturing temperature, or actual maturing temperature appear to have little effect on the aging. There was no apparent effect on the aging of T-153-M by additions of small amounts of single impurity additions at the end of 700 hours. At the end of 1000 hours there is no apparent effect on the aging of T-153-M by varying the iron content approximately 50% of normal amount. At the end of 1000 hours there was no significant difference in the aging of pure barium titanate and a 50 - 50 mixture of pure and commercial barium titanate. There was no significant difference in the aging of T-153 made with pure barium titanate or the 50 - 50 mixture. Bismuth stannate composition can be made from pure raw materials. It has not been possible to form T-153-M in the test forms by extrusion or casting. At the end of 384 hours samples fired to maturity at temperatures from 2100°F at 2300°F show little or no aging. At the end of 336 hours of aging there does not seem to be any significant difference in the aging due to silver schedules or type of silver. (See also PB 163 668)

PB 163 672 OTS $1.10

American Lava Corp., Chattanooga, Tenn.
AN INVESTIGATION OF THE EFFECT AND POSSIBLE ELIMINATION OF CRYSTAL CHANGES IN CERAMIC BODIES FOR USE IN V. T. FUZES. Monthly progress rept. no. 10, 21 Aug-20 Sep 54, by Karl E. Nelson. 28 Sep 54, 7p
Contract DA 33-008-ORD-862
AD-41 899

DESCRIPTORS: *Fuzes (Ordnance), *Radio proximity fuzes, Ceramic capacitors, *Capacitors, *Dielectrics, *Ceramic materials, *Crystal structure, Microstructure, *Barium compounds, *Titanates, Additives, *Titanium compounds, Oxides, *Aging (Materials), Heat treatment, Calcination.

Natural and lapped surfaces of pure barium titanate samples were prepared and investigated. Electron micrograph studies reveal that both surfaces are nearly identical. The possibility of stabilizing barium titanate in the cubic form by using stabilized zirconium oxide additions was investigated. The T-154 calcines containing molar ratios of .95 to 1.05 $BaO:1TiO_2$ have been investigated and the results indicate that the $BaO-TiO_2$ ratio has very little influence on the T/C and aging characteristics. (See also PB 163 675)

PB 163 654 OTS $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ON THE RANGE EFFECT IN RADAR ECHO MEASUREMENT. Rept. on Measurements of Reflection Characteristics, by P. B. Moranda and Donald R. Rhodes. 15 Apr 54, declassified 4 Sep 57, 12p 5refs
Contract AF 18(600)19
Engineering rept. 475-9; AD-35 735

DESCRIPTORS: *Radar signals, Radar reflections, Ranges (Distances), *Airplane models, Cylindrical bodies, *Radar echo areas.

While the echo area associated with broadside aspects changes radically with range, the median (when this statistic is taken over a 10^{o} interval centered at broadside) is relatively insensitive to changes in range. When the range of aspects is confined to a shorter interval all percentile values are range sensitive. An indication of the range effect over a 6^{o} interval is evident from the percentile distribution. Measurements made on a large cylinder show excellent agreement with the physical optics theory used to make the calculations on which the above conclusions are based. (Author)

PB 163 310 OTS $3.60

Electronics Research Lab., U. of California, Berkeley.
OPTIMAL CONTROL AND THE CALCULUS OF VARIATIONS, by A. Larsen. 26 Jul 62, 33p 10refs
Grant no. G-9106
IER series no. 60, issue no. 462

DESCRIPTORS: Optimalization, *Control theory, Control systems, *Calculus of variations, Inequalities.

This report, chiefly tutorial in nature, presents an elementary but self-contained treatment of that part of the theory of the classical Bolza problem of the calculus of variations necessary for deriving Pontryagin's maximum principle. The maximum principle derivation is included, with inequality constraints treated by the method of Valentine. (Author)

PB 163 311 OTS $6.60

Electronics Research Lab., U. of California, Berkeley.
A SYNOPSIS OF OPTIMAL CONTROL THEORY, by R. E. Mortensen. 14 Nov 62, 60p 16refs
Grant G-15965
IER series no. 60, issue no. 487

DESCRIPTORS: Optimalization, *Control theory, *Control systems, Equations of motion, Calculus of variations, Differential equations, Partial differential equations, Transformations (Mathematics).

The purpose of this report is to survey, more or less from an engineering point of view, certain topics from classical analysis and mechanics, in order to attempt to provide a background for reading modern literature in the field of optimal control theory. The topics mentioned at least briefly are: the Euler-Lagrange differential equations from the calculus of variations; Hamilton's differential equations; the fitting of end point or boundary conditions to these equations; changes of variable and the use of Poisson and Lagrange brackets; Cauchy's result concerning the characteristics of first order partial differential equations; Pfaff's problem of differential forms; Lie's theory of contact transformations; the transformation theory of conservative dynamic systems; and the Hamilton-Jacobi equation. Certain relationships of these topics to the modern developments known as Pontryagin's maximum principle and Bellman's dynamic programming are pointed out. (Author)

PB 163 350 OTS $5.60

Linden Labs., Inc., State College, Pa.
HIGH TEMPERATURE CERAMIC DIELECTRICS. Quarterly rept. no. 2 by W. R. Buessem and P. A. Marshall, Jr. 15 Oct 60, 59p 7refs
Contract DA 36-039-sc-78912, continuation of Contract DA 36-039-sc-75036
Rept. no. 8; AD-247 289

DESCRIPTORS: *Ceramic materials, *Dielectrics, *Barium compounds, *Titanates, *Aluminum compounds, Oxides, *Fluorination, Heat treatment, Mechanical properties, Hardness, Stability, Degradation, Theory, Electrical properties, Resistance (Electrical), Dielectric properties, Ferroelectric materials, *Tantalum compounds.

The present report contains data on two processes which are of practical interest. The first one is the fluorination of $BaTiO_3$ bodies in a continuous firing operation (tunnel kiln). The data can be used to compute the fluorine loss in the furnace as a function of time and to devise a continuous reconditioning schedule to maintain optimum quality of the fired bodies. The second process concerns the HF-treatment of Al_2O_3 bodies (dense micromodules). In a practical application this process would allow easy grinding of Al_2O_3 to close tolerances. The discussion of the experimental results includes a detailed analysis of the electrical data of the fluorinated bodies and of bodies with Ta_2O_3-additions. (See also PB 162 558)

PB 163 351 OTS $6.60

Linden Labs., Inc., State College, Pa.
HIGH TEMPERATURE CERAMIC DIELECTRICS. Quarterly rept. no. 3, by W. R. Buessem and P. A. Marshall, Jr. 15 Jan 61, 61p
Contract DA 36-039-sc-78912
Rept. no. 9; AD-252 687

DESCRIPTORS: *Ceramic materials, *Dielectrics, *Barium compounds, *Titanates, *Aluminum compounds, *Tantalium compounds, Oxides, *Lead compounds, *Zirconates, *Fluorination, Heat treatment, Mechanical properties, Stability, Degradation, Electrical properties, Resistance (Electrical), Dielectric properties, Semiconductors, Ferroelectric materials.

Experiments on continuous fluorination of BaTiO3-bodies in a tunnel kiln are described, involving reconditioning of the kiln in several hour intervals during the firing operation. The mechanical and dielectric properties of fluorine treated and subsequently heat treated A1203-micromodules were investigated. The H20-content of the atmosphere during the heat treatment had little effect on the final properties and the main factor in restoring and improving the initial low losses is a sufficiently high temperature, (greater than 1500 C). Fluorine treatment of lead zirconate-lead titanate bodies at temperatures of 1000 and 1050 C produced substantial improvement of the high temperature resistivity. New firings were made of the BaTiO3 bodies with Ta205 and extra BaO-additions, this time on Pt to avoid reaction with ZrO2. The boundary between the semiconducting range (blue bodies) and the insulating range (white bodies) depends strongly on temperature. (Author) (See also PB 163 350)

PB 163 313 OTS $9.60

Microwave Lab., Stanford U., Calif.
DESIGN AND CONSTRUCTION OF A 50--67 kMc/s CYCLOTRON RESONANCE BACKWARD-WAVE OSCILLATOR. Technical rept. by William Bruce Lindsay. Jul 62, 116p 34refs
Grant NSF-15011
M.L. rept. no. 925

DESCRIPTORS: *Microwave equipment, *Cyclotron resonance phenomena, Microwave oscillators, *Backward-wave oscillators, Design, Construction, *Magnets, Magnetic fields, *Electron guns, *Waveguides, Mandrels, Waveguide couplers, Waveguide windows, *Bonding, Metals, Ceramics.

In this device traveling-wave interaction takes place between the transverse electromagnetic fields of a fast wave in an unloaded waveguide and a helical electron beam which rotates at the cyclotron frequency of the longitudinal magnetic field. The radio frequency generated is very nearly equal to the cyclotron frequency. Difficulties associated with periodic circuits which limit ordinary traveling-wave tube operation at millimeter wavelengths are eliminated, but special problems arise in connection with beam injection and space-charge control. The theory of operation is reviewed, and the design of a 50-67 kMc/s 1 watt cw oscillator is worked out in detail. Descriptions of the fabrication and performance of the components are presented. All of the design objectives involving components within the vacuum envelope appear to have been achieved. Full-scale operation of the device is expected, after modification of the external magnetic field. (Author)

OTS SB-447, Revised $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
FUEL CELLS. Aug 63, 17p 204refs
OTS Selective Bibliography SB-447, rev.

DESCRIPTORS: *Batteries and components, *Energy conversion, *Fuel cells, *Bibliographies

Lists 204 reports and translations added to the OTS collection during the period 1958 through August 1963. Covers research on fuel cell materials, fuel cell batteries, gaseous fuel cells, liquid metal fuel cells, biochemical fuel cells, redox fuel cells, hydrocarbon fuel cells, fuel cell catalysts and other fuel cells and related technology. (Author)

PB 163 465 OTS $1.10

Pittsburgh U., Pa.
RARE EARTH CHALCOGENIDES. Technical progress rept., 15 Nov 59-15 Jan 60, by August R. Freda.
30 Jan 60, 2p
Contract NObs-77068

DESCRIPTORS: *Semiconductor devices, *Thermoelectric generators, *Rare earth compounds, *Chalcogens, *Cerium compounds, *Oxides, Impurities, *Selenium, Electrical properties, Resistance (Electrical).

The electrical resistivities of the undoped and selenium doped sintered compacts of ceric oxide (CeO_2) were re-evaluated. The resistance of the undoped compact was found to be in excess of 500 megohms, the limit of the bridge. The compact of CeO_2 which was heated in a vacuum with selenium metal also exhibited a resistance of greater than 500 megohms. These extreme resistances seemed to give credence to the assumption that the compacts contained microscopic cracks due to their sensitivity to thermal shock. The results of these experiments indicate that ceric oxide as prepared by this method is not suitable as a thermoelectric generating material. (See also PB 160 577)

PB 163 464 OTS $1.10

Pittsburgh, U., Pa.
RARE EARTH CHALCOGENIDES. Technical progress rept., 1 May-1 Aug 60, by August R. Freda.
30 Jul 60, 6p
Contract NObs-77068

DESCRIPTORS: *Semiconductor devices, *Thermoelectric generators, *Rare earth compounds, *Chalcogens, *Cerium compounds, *Sulfides, Synthesis (Chemistry), *Impurities, X-ray diffraction analysis.

The problem of developing a suitable thermoelectric power generating material has been approached in two ways. The first is an attempt to dope CeO_2 with any of a number of elements or compounds in order to decrease the resistivity to a reasonable value. A second method is utilizing the rare earth chalcogenide, Ce_2S_3, which is a known semiconductor. Since the purity of Ce_2S_3 procured elsewhere was not satisfactory, the synthesis of Ce_2S_3 was undertaken. Several unavoidable difficulties were encountered in the method of synthesis and, as a consequence, a different method is being tried. (See also PB 163 465)

PB 163 463 OTS $1.10

Pittsburgh, U., Pa.
RARE EARTH CHALCOGENIDES. Technical progress rept., 1 Dec 60-28 Feb 61, by August R. Freda.
10 Mar 61, 2p
Contract NObs-77068

DESCRIPTORS: *Semiconductor devices, *Thermoelectric generators, *Rare earth compounds, *Chalcogens, *Oxides, *Sulfides, Synthesis (Chemistry), X-ray diffraction analysis.

The sesquisulfide of cerium has been difficult to synthesize. One of the major problems results in the isolation of the initial compound, CeO_2, and the final product from extraneous oxides obtained from temperatures recommended for the conversion of CeO_2 to Ce_2S_3 (750-850°C). (See also AD-266 097)

SCTM-128-62(14) OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
AN EXPERIMENTAL COMPARISON OF HARD LIMITING VERSUS AGC IN BINARY FREQUENCY-SHIFT RECEIVERS, by Charles S. Williams. June 62, 12p
Contract AT(29-1)789

PB 163 499 OTS $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS. Bi-monthly progress rept. no. 19, 1 Mar-1 May 62, by J. W. Johnson.
16 May 62, 3p
Contract NObs-77017
SRI Proj. no. SU-2681

DESCRIPTORS: *Semiconductor devices, Thermoelectric generators, Materials, *Bismuth compounds, *Copper compounds, *Sulfides, *Tellurides, Electrical properties

Efforts were continued to determine the Seebeck coefficient of the system bismuth metal-bismuth sulfide as a function of sulfur pressure. Although the test was not successful it demonstrated that an increase in sulfur content does improve the Seebeck coefficient and confirmed previous observations that bismuth sulfide is an n-type liquid. (See also PB 160 976)

PB 163 500 OTS $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS. Bi-monthly progress rept. no. 23, 1 Nov-62-1 Jan 63, by J. W. Johnson.
16 Jan 63, 3p
Contract NObs-77017
SRI Proj. no. SU-2681

DESCRIPTORS: *Semiconductor devices, *Thermoelectric generators, Materials, *Bismuth compounds, *Sulfides, Electrical properties

Attempts to measure the resistivity of bismuth metal as a function of temperature from 300 to 750°C have resulted in resistivities about 1 percent higher than those reported in the literature. (See also PB 163 499)

PB 163 505 OTS $1.10

Titanium Alloy Mfg. Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS. Bi-monthly progress rept. no. 13, 1 Jan-28 Feb 62. 15 Mar 62, 9p
Contract NObs-78326

DESCRIPTORS: *Semiconductor devices, *Thermoelectric generators, *Ceramic materials, *Titanium compounds, *Zirconium compounds, *Cerium compounds, Lithium compounds, Yttrium compounds, Dioxides, Oxides, Chromates, Silicates, Preparation, Sintering, Dehydration, *Material forming, Electrical properties

This report covers preparation of ceramic test specimens, by both customary and unconventional methods, and preparation of materials. Extension of the scale of measurements to larger values of electrical resistivity has been made in order to evaluate more completely those modified materials discussed previously. (See also AD-278 452)

PB 163 506 OTS $1.60

Titanium Alloy Mfg. Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS. Bi-monthly progress rept. no. 14, 1 Mar-30 Apr 62. 15 May 62, 11p
Contract NObs-78326

DESCRIPTORS: *Semiconductor devices, *Thermoelectric generators, *Ceramic materials, *Titanium compounds, *Cerium compounds, *Lithium compounds, *Zirconium compounds, *Lead compounds, Oxides, Dioxides, Titanates, Niobates, Preparation, Sintering, *Material forming, *Lanthanum compounds, Chromates, Electrical properties

This report covers preparation of ceramic test specimens and electrical screening measurements on some earlier preparations. Manual measurement of materials with resistivities greater than the previous upper limit of 5 ohm-cm has been initiated but no final data yet obtained. (See also PB 163 505)

PB 163 508 OTS $1.10

TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE. Monthly letter-type progress rept. no. 1, 3 Jul-2 Aug 61, by A. I. Mlavsky. 8 Aug 61, 2p
Contract NObs-86015

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, Materials, Lead compounds, Tellurides, *Bonding, Thermal stresses, Material forming.

An apparatus has been constructed for diffusion-bonding thermoelectric materials to electrodes under carefully controlled conditions of temperature, atmosphere, and pressure. A small number of N-type PbTe thermoelements (M. M. M. cold-pressed and sintered) have been successfully bonded to Armco iron end caps. All the bonds made have shown perfect interfaces, and uniformly low values of contact resistance, measured at room temperature, of ca. 10 microohm-cm^2. An apparatus for testing the behavior of thermoelectric materials under severe temperature gradients, and on temperature cycling, is being constructed. A number of thermoelectric materials are being made by different metallurgical techniques, primarily hot-pressing, in order to evaluate the behavior of materials under operating conditions as a function of their initial mechanical properties.

PB 163 509 OTS $1.10

TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE. Monthly letter-type progress rept. no. 2, 3 Aug-2 Sep 61, by A. I. Mlavsky. 11 Sep 61, 4p
Contract NObs-86015

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, Materials, *Lead compounds, *Tellurides, Thermal stresses, Test methods, *Material forming, Hot-working.

A schematic drawing shows an apparatus which has been built for the thermal testing of thermoelectric samples. A radiant source is used to heat one face of a sample, the other face of which is mounted on a water-cooled pedestal using silver paste. The pedestal is hermetically enclosed in a pyrex vessel which is provided with a plane window, and with means for evacuating and backfilling with inert gas. Several samples of alloy #104 (a cast P-type PbTe-based alloy) have been used to test the apparatus. Hot end temperatures of 600°C, and thermal gradients of about 500°C over 3/16" (ca. 1000°C/cm) have been achieved using 1/4" square section samples. Some initial experiments have been performed on hot-pressing 0.03 mole % PbI_2-doped PbTe. (See also PB 163 508)

PB 163 510 OTS $1.10

TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE. Monthly letter-type progress rept. no. 3, 3 Sep-3 Oct 61, by A. I. Mlavsky. 15 Oct 61, 6p
Contract NObs-86015

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, Materials, *Lead compounds, *Antimony compounds, *Tellurides, *Material forming, Casting, Ultrasonic radiation, *Bonding.

Several samples of cold pressed and sintered PbTe, both N-andP-type, and of alloy #71-2 (N-type) have been tested. Some of the test results are tabulated. The grain structure of cast lead telluride is invariably columnar, giving rise to poor mechanical properties. In order to prepare stronger material, attempts were made to refine the grain size and configuration by ultrasonically agitating the liquid PbTe as it cooled through the solidus. Initial results were encouraging, although the structures obtained were not ideal since the grain size was still large. Since the solid state diffusion-bonding technique used for N-type lead telluride is unsatisfactory for P-type lead telluride, work has been initiated to investigate alternative bonding methods. The method under investigation at this time involves the use of an intermediate bonding agent between the electrode material, iron and the P-type lead telluride. The

intermediate layer has been chosen from P-type semimetals in the elemental or compound form, such as antimony and Sb_2Te_3. Early results of this investigation indicate some promise of a useful technique. (See also PB 163 509)

PB 163 511 OTS $1.10

TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE.
Monthly letter-type progress rept. no. 4, 7 Oct-6 Nov 61, by A. I. Mlavsky. 15 Nov 61, 6p
Contract NObs-86015

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, *Bonding, *Iron, *Lead compounds, *Tin compounds, *Germanium compounds, *Antimony compounds, *Tellurides, Thermal stresses.

A diffusion bonding technique has been employed for the bonding of N-type lead telluride to Armco iron. Both commercially available extruded, and cold pressed and sintered, lead telluride have been investigated. The mechanical strength of these bonds has not been determined; however, they have been found to withstand severe thermal shock. The applicability of various intermediate materials to the bonding of p-type lead telluride to Armco iron has been investigated. The p-type semimetal compounds investigated were SnTe, GeTe and Sb_2Te_3. The bonds between PbTe and Sb_2Te_3 or SnTe were also investigated. Because of the excellent properties exhibited by the Fe-SnTe and SnTe-PbTe bonds, a study was initiated to determine the stability of these bonds at 500°C. Some preliminary tests on bonded N-type thermoelements have been performed. Several bonded N-type elements have been subjected to temperature gradients in excess of 1000°C/cm for periods up to 7 hours. No apparent degradation in mechanical or thermoelectric properties has yet been observed. (See also PB 163 510)

PB 163 512 OTS $1.10

TYCO Labs., Inc., Waltham, Mass.
POWER DENSE THERMOELECTRIC MODULE.
Monthly letter-type progress rept. no. 5, 7 Nov-8 Dec 61, by A. I. Mlavsky. 15 Dec 61, 6p
Contract NObs-86015

DESCRIPTORS: *Semiconductor devices, *Thermoelectricity, *Bonding, *Iron, *Lead compounds, *Tin compounds, *Tellurides, Thermal stresses.

Seventeen samples of N-type PbTe have been bonded to Armco iron electrodes. In almost all cases the bonds have been found to be mechanically and metallurgically sound. Continued life tests of the SnTe-PbTe couples conclusively demonstrated that no change in mechanical strength or electrical contact resistance occur after 120 hours at 535°C. Since these materials retained their basic chemical integrity under operating conditions, work was initiated to produce and test Armco Fe-SnTe-PbTe thermoelements. The most successful procedure to date for elimination of porosity has been to produce the bond by direct fusion of a solid SnTe slice between the Fe electrode and the PbTe bar. Results are given of several hours of static thermal gradient testing on both bonded and unbonded samples of N-type PbTe. (See also PB 163 511)

PB 163 466 OTS $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
FIVE KILOWATT THERMOELECTRIC GENERATOR.
Bimonthly progress letter no. 4, by S. J. Angello.
12 Nov 59, 11p. 1refs
Contract NObs-77093

DESCRIPTORS: *Semiconductor devices, Thermoelectric generators, Design, *Germanium compounds, *Bismuth compounds, *Tellurides, *Thermocouples, Geometry, Tests, *Burners.

In an attempt to make possible an ultra compact 5KW thermoelectric generator, the goal for heat flux density has been raised to 50 watts/sq. in. At the present time, it is difficult to determine whether or not this flux density can be achieved with available burner systems. A new material is being considered for use with the P leg of the thermoelement assembly. It is GeBiTe and is designed to function in the temperature range of approximately 330°C to 550°C. An analytical program has been underway to determine the most suitable method of treating the various factors of importance in the design of the thermocouple and preliminary computations have been completed on typical couple geometries that might be used. A brief report on the preliminary results of this analytical program is included. A life testing program of the thermoelement assemblies has been initiated to determine the changes resulting from sustained operation. The three burner types that are still being tested and evaluated are the low air pressure oil atomizing type, the micro porous gas type infrared generator, and the metal screen gas burning infrared generator. (See also PB 162 042)

Ordnance, Missiles, and Satellite Vehicles

NASA N63-12539 OTS $3.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THEORETICAL INVESTIGATION OF THE PERFORMANCE OF PROPORTIONAL NAVIGATION GUIDANCE SYSTEMS:EFFECT OF METHOD OF POSITIONING THE RADAR ANTENNA ON THE SPEED OF RESPONSE, by Marvin Abramovitz.
13 Aug 52, declassified 14 Sep 62. 34p 5refs
Research memo. RM A52E27

NASA N63-19606 OTS $1.00

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
HANDLING QUALITIES AND TRAJECTORY REQUIREMENTS FOR TERMINAL LUNAR LANDING, AS DETERMINED FROM ANALOG SIMULATION, by Gene J. Matranga and Harold P. Washington.
Aug 63, 34p 10refs
(NASA TN D-1921)

NASA N63-19950 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER VENUS POWER-SUPPLY SYSTEM, by E. N. Costogue. 30 Mar 63, 24p
Contract NAS7-100
Technical rept. no. 32-424; NASA CR-59724

NASA N63-19785 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena
A SIMPLIFIED STATISTICAL MODEL FOR MISSILE LAUNCHING — III, by Carleton B. Solloway.
1 Jul 63, 10p 2refs
Contract NAS7-100
Technical rept. no. 32-431, pt. 3; NASA CR-50615

NASA N63-14758 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEATING AND IMPACT TESTS ON INSULATED AND UNINSULATED BALLISTIC-MISSILE FUSE MECHANISMS SUBJECTED TO SIMULATED REENTRY AERODYNAMIC HEATING, by Willie L. Nix. Jan 59, 23p. 2 refs.
(NASA MEMO 12-5-58L) declassified 12 Mar 63

NASA N63-19651 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A COMPARATIVE ANALYSIS OF CONVECTIVE HEAT TRANSFER IN A NUCLEAR ROCKET NOZZLE, by Harvey E. Neumann and Paula J. Bettinger. Aug 63, 28p 17refs
NASA TN D-1742

PB 163 660 OTS $4.60

Naval Ordnance Lab., White Oak, Md.
AN ANALYSIS OF SOLUTIONS OF THE POINT BLAST PROBLEM, by Andre' N. Gleyzal. 1 Nov 57, 41p 8refs
NAVORD rept. 4183

DESCRIPTORS: *Explosions, *Underwater explosions, *Explosion effects, Pressure, Density, Velocity, *Partial differential equations, Shock waves, Numerical methods and procedures, Series, Transformations (Mathematics), Mathematical analysis, *Blast.

Methods of solution are considered for the partial differential equations which describe the pressure, density and velocity distribution in water due to the instantaneous release of a finite amount of energy at a single point. The singularity at this point is shown to be expressible in fractional powers of the radius r and time t. Transformations are introduced which eliminate this singularity, and express the solution in integral powers of two variables. These series, after substitution in the transformed partial differential equations, retain just the required degree of flexibility so that the boundary conditions may be satisfied. (Author)

AD-409 852 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
NONLINEAR BRIDGE FOR MEASURING ELECTRO-THERMAL CHARACTERISTICS OF BRIDGEWIRES, by Louis A. Rosenthal. 5 Mar 63, 21p 3refs
NOLTR 62-205

DESCRIPTORS: *Electric bridges, Exploding wires, Thermal conductivity, Differential equations, Heat transfer, Phase shifters, Instrumentation, Resistance (Electrical), Electrical properties, Electric igniters, Explosive initiators, Electric currents, Amplitude modulation, Nonlinear systems.

The measurement of the thermal time constant and the heat loss factor of a bridgewire from the amplitude and phase shift of the third harmonic generated in it by a sinusoidal current has been shown feasible. The theory and mathematics have been presented and an electronic instrument which was built for the measurements has been described and detailed. The new instrument greatly accelerates the measurements of the thermal time constant and the heat loss factor. The instrument will be particularly useful for making measurements on electro explosive devices containing bridgewires of very low thermal coefficients of resistivity, such as tophet -C. The measurements made with the new instrument show the results to be in good accord with the theory and mathematics, and in addition indicate that in general the thermal characteristics of a bridgewire can be described by the constants of the simple power balance differential equation. (Author)

AD-408 723 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
SCALING THE ENERGY SPECTRA OF UNDERWATER EXPLOSION SHOCK WAVES, by Ermine A. Christian. 2 Apr 63, 28p 10refs
NOLTR 62-36

DESCRIPTORS: *Underwater explosions, Shock waves, Explosions, Counting methods, Energy, Charges (Explosive), Echo ranging, Measurement.

Scaling factors with which the energy spectrum for an underwater shock wave can be scaled from one set of conditions (i.e., explosive composition, charge weight, and range) to a second set of conditions are derived. Analogous scaling factors for an ideal acoustic wave are also shown. The spectrum measured at 1 yard from a 1-lb charge is scaled to two other conditions (viz., 100 yards from a 1-lb charge, and 280 yards from a 1.8-lb charge) for which measured values are also available. In both cases the explosion scaling is in agreement with the data whereas the ideal acoustic scaling gives spectrum levels that are two high at the higher frequencies. The allowable ranges of variables for the spectrum scaling functions shown here are estimated to be: 0.5 greater than the frequency (kc) and less than 20 where W to the 1/3 power divided by R ranges between 4 x 0.0001 and 3, where W is charge weight in pounds and R is range in yards. Details of the spectral analysis of measured shock waves and a method of estimating the effect of explosive composition on spectrum level are given in appendices. (Author)

PB 163 659 OTS $4.60

Naval Ordnance Lab., White Oak, Md.
A THEORY OF THE SHOCKWAVE PRODUCED BY A POINT EXPLOSION, by Hans G. Snay. 1 Dec 57, 49p 8refs
NAVORD rept. 4182

DESCRIPTORS: *Explosions, *Underwater explosions, *Explosion effects, *Shock waves, Velocity, Density, Pressure, Integrals, Polynomials, Hydrodynamics, Differential equations, Mathematical analysis, Theory, Spheres.

Approximate integrals of the spherical blast equations with variable isentropic exponents are derived. The distributions of velocity, density and pressure within the sphere of disturbance are expressed in polynomials. These are used to calculate the "reduced energy" which is closely related to the relationship between shockwave peak pressure and distance. For very large distances, the well known asymptotic behavior of weak shockwaves is obtained. (Author)

AD-408 939 repriced $0.75

Naval Ordnance Lab., White Oak, Md.
A VERY SENSITIVE AMPHIBIOUS LOOP MAGNETOMETER, by Abraham Silverstein and Frank G. Salton. 30 Apr 63, 27p 6refs
NOLTR 63-102

DESCRIPTORS: *Magnetometers, *Detectors, *Loop antennas, Underwater, Sea water, Electrical impedance, Sensitivity, Underwater equipment, Underwater sound signals, Amplifiers, Preamplifiers, Transformers, Electromagnetic waves, Acoustic detectors.

A very sensitive loop magnetometer has been built for use at any sea depth and in air. The design uses single turn loops, a novel transformer, and a vacuum tube input. The effective frequency range is from 1 - 5000 cps but may be extended. (Author)

AD-288 819 OTS $1.60

Research Analysis Corp., Bethesda, Md.
MATERIALS-HANDLING EQUIPMENT: JOB-ORDER CONTROL AND A PROCUREMENT MODEL, by Murray L. Eisenberg and Leon N. Karadbil. Aug 62, 11p 1ref
Contract DA 44-188-ARO-1
Technical paper RAC-TP-71

DESCRIPTORS: *Maintenance, *Costs, *Materials, *Military procurement, Vehicles, Military requirements, Records, Handling, Job analysis.

The implementation of a regulation requiring field installations to follow the maximum annual repair limitation schedule should include a modus operandi for controlling the individual job order within the annual expenditure limits. A simple control using current forms and available information is proposed.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

PB 163 598 OTS $2.60

American Meat Inst. Foundation, Chicago, Ill.
A STUDY OF CHEMICAL CHANGES PRODUCED BY HEAT AND BY IRRADIATION OF MEAT AND MEAT FRACTIONS. Rept. no. 12 (Final), 24 Sep 58-21 Sep 61, by W. A. Landmann. [1961] 25p 18refs
Contract DA 19-129-qm-1293
File no. S-586

DESCRIPTORS: *Meat, *Radiation effects, *Odors, *Chemical analysis, Proteins, Beef, *Preservation, Heat.

This report describes the attempts to determine which fractions of irradiated (5 megarad) raw and cooked beef give rise to some of the off-odors produced by this process. Experiments to determine the precursor materials from which the specific off-odor, described as "wet dog hair," arises, are given in detail. A comparison is made between the "wet dog hair" odor of a water soluble protein fraction and that obtained from a phospholipid fraction of irradiated raw and cooked beef. Although the precursor material from the phospholipid fraction has been purified, no positive identification has been made. The various chemical and physical tests applied to this material are described. Various implications of the results obtained are discussed. (Author)

PB 163 595 OTS $2.60

[IIT Research Inst.] Chicago, Ill.
MONCHEMICAL METHODS OF ENZYME INACTIVATION, Rept. no. 4 (Final), 15 Apr 59-14 Apr 60, by Maurice E. King. 13 Jun 60, 24p 2refs
Contract DA 19-129-qm-1387
Rept. no. ARF 3145-4; File no. S-592; AD-251 492

DESCRIPTORS: *Meat, *Beef, *Radiation effects, *Cooking devices, *Preservation, *Enzymes, Inhibition, Peptide hydrolases, Proteins, Food, Heating.

A nonchemical method for enzyme inactivation in meat to be used with radiation sterilization was studied. It is based on heating by electromagnetic energy. Adequate penetration is theoretically obtained with maximum absorption at 200-500 mc. Commercial equipment operates either above or below this range, and units operating at 5-200 mc and 1300 mc were found in initial tests to need extensive modifications to heat large meat samples in a short time. Three 2450-mc electronic ovens were tested for heating ability and effect on proteolysis. Meat was heated and irradiated and the amino acids liberated by proteolytic enzymes after 6 weeks at 98 F were assayed by a modified ninhydrin method. Heating in these ovens followed by irradiation alone was effective, and variations did not offer any advantage. The appearance and odor of the meat were good; its final temperature did not influence the proteolysis decrease. Since inhibition was attained with small samples only, further work is necessary to extend the results to large-scale processing. (Author)

PB 163 453 OTS $3.60

California U., Berkeley.
INFORMATION REGARDING THE FACTORS CONTRIBUTING TO THE INSTABILITY OF THE CAROTENOID PIGMENTS IN DEHYDRATED YELLOW SWEET CORN. Rept. no. 11 (Final), 15 May 57-15 Feb 59, on Simplified Food Logistics, by G. MacKinney and L. G. Wilson. [1959] 39p
Contract DA 19-129-qm-893
File no. V-327; AD-230 778

DESCRIPTORS: *Corn, *Dehydrated substances, *Carotenoids, Plant pigments, Vegetables, *Bleaching, Sulfites, *Preservation, Graphic analysis.

The effects of SO_2 on carotenoid stability were studied. Bleaching is shown in model systems, but not in the whole kernel sweet corn, in levels up to 5000 ppm under pilot plant conditions. Instability may result with very immature samples, on which insufficient data are available. The various process and storage variables tested had no significant effect on the resultant carotenoid level. (Author)

PB 163 603 OTS $1.60

National Canners Association, Berkeley, Calif.
DETERMINATION OF RELATIVE RESISTANCE OF SELECTED STRAINS OF CLOSTRIDIUM BOTULINUM TO IONIZING RADIATIONS. Rept. no. 5 (Final), 14 May 58-13 Dec 59, by Charles T. Townsend. [1959] 18p 6refs
Contract DA 19-129-qm-1184
File no. S-578; Ad-244 847

DESCRIPTORS: *Radiation effects, *Clostridium botulinum, *Bacteria, Spores, Radiation tolerance, Food, *Preservation, Radiological dosage.

Spore suspensions of eighteen selected strains of *Clostridium botulinum, encompassing serological types A, B and E, were subjected to three or more sublethal levels of ionizing radiation in beef broth, M/15 neutral phosphate buffer, and pork pea broth. The radiation resistance of the various strains was compared on the basis of the median dosages, necessary to destroy 999,900 of one million viable spores (99.99%) of each strain in three substrates. On the basis of these data the following relationships are indicated: (1) the rate of population reduction with increasing amounts of irradiation is essentially logarithmic; (2) most of the more radiation resistant strains are in the type A group, but there is over-lapping between all three of the types studied; and (3) relative radiation resistance is not constant from one substrate to another. (Author)

PB 163 604 OTS $8.60

Oklahoma State U., Stillwater.
DETERMINING THE EFFECT OF ANIMAL MATURITY AND FAT DISTRIBUTION ON THE QUALITY OF IRRADIATED BEEF. Rept. no. 7 (Final) 6 Sep 57-30 Jun 60, by R. L. Henrickson. [1960] 99p
Contract DA 19-129-qm-1033
File no. S-570; AD-248 855

DESCRIPTORS: *Meat, *Beef, *Radiation effects, *Fats, Taste, Storage, Radiological dosage, Gamma rays, Food, Aging (Physiology).

Ground Beef: The analytical panel was able to recognize the irradiation flavor and tended to discriminate against it. In all age groups, the preference ratings decreased as the irradiation dose increased. Ground meat from animals slaughtered at 12 months of age was generally old animals. Altering the fat content of the ground meat caused some change in eating preference of the irradiated product during storage. Steak: Shear and taste panel values indicated that some tenderness variation does exist among animals. An irradiation treatment was found to improve the tenderness of both the semitendinosus and longissimus dorsi muscles. No improvement in flavor, aroma, or texture was observed when beef was irradiated prior to the onset of rigor.

PB 163 597 OTS $3.60

Purdue Research Foundation, Lafayette, Ind.
DEVELOPMENT OF IRRADIATION STERILIZED MEAT PRODUCTS, Rept. no. 8 (Final), 15 Jan 59- 14 Jan 61, by W. J. Stadelman [1961] 31p
Contract DA 19-129-qm-1364
File no. S-589

DESCRIPTORS: *Meat, *Radiation effects, *Preservation, Taste, Odors, Colors, Hormones.

The objective of this study was to develop procedures for preparing an acceptable irradiation sterilized poultry meat item. Two such products, chicken and turkey, were prepared and evaluated as acceptable for flavor, odor, color, and tenderness using subjective and objective evaluation techniques. It was found that charcoal barbecuing, using a tomato paste base sauce, effectively masked the objectionable flavor, odor, and color of fresh irradiated poultry meat. Shear press values were high but compared favorably with precooked frozen chicken meat. Data are presented relative to the effectiveness of hormonization for increasing tenderness; the effect of method of enzyme inactivation of acceptability of irradiated chicken meat; and the effect of storage time on acceptability. (Author)

PB 163 594 OTS $6.60

Stanford Research Inst., Menlo Park, Calif.
RADIOACTIVE ISOMER PRODUCTION IN FOODS BY GAMMA RAYS AND X-RAYS. Rept. no. 3 (Final), 20 Nov 59-31 Aug 60, on Measurement of Radioactive Isomers Produced by Gamma Rays, by Richard A. Glass and Herbert D. Smith. 3 Oct 60, 66p 48refs
Contract DA 19-129-qm-1511
SRI Proj. no. SU-3081; File no. S-594; AD-250 828

DESCRIPTORS: *Food, *Gamma rays, *X-rays, Meat, Fabacea, *Nuclear isomers, *Radioactive decay, Atomic energy levels, *Preservation, Radiation effects.

Irradiations were performed on a group of elements expected to produce isomers; a group of food elements; and a group of foods including beef, bacon, shrimp, chicken, and green beans. A variety of radiation sources were utilized including Cs 137, Co60, and spent-reactor-fuel-element gamma-ray sources in addition to 4-, 8-, 16-, and 24-Mev x-ray sources. The results show that sterilization with the gamma-ray and x-ray sources does not add a significant amount to natural radia-

tion levels in foods. The radioactivity of Sn117m, and Sn119m, which are the most prominent long-lived isomers, amounts to only 0.1-1.0 disintegration-per-minute/lb/5 Mrads at the highest energy (24 Mev). A literature survey and analysis was also performed to look for possible additional isomers which might be produced in foods. Considerations of energy levels and regularities in isomer lifetimes, show that the possibility of finding undiscovered isomers of a minute or longer half-life in food elements of over 1 ppm abundance is very remote. The conclusion reached on radioactive isomer production in foods is that with gamma- and x-ray sources up to 24 Mev in energy no appreciable quantity of radioactivity is added to natural levels of K40 and C14 present in the foods. (Author)

PB 163 593 OTS $3.60

Stanford Research Inst., Menlo Park, Calif.
A STUDY OF THE EFFECTS OF COMBINING ULTRASONICS AND IONIZING RADIATION UPON BACTERIAL SPORES. Rept. no. 2 (Final), 7 Jun 60-6 Jun 61, by Luman F. Ney. 9 Oct 61, 36p 6refs
Contract DA 19-129-qm-1610
SRI Proj. no. PBU-3289; File no. S-604

DESCRIPTORS: *Radiation effects, *Ultrasonic radiation, *Clostridium botulinum, *Bacteria, Spores, *Preservation

The program included experiments to determine the effects of insonation and irradiation applied separately and in combination to suspensions of Clostridium botulinum spores. It was found that at various frequencies insonation under cavitation conditions for periods of time up to 40 minutes or more generally resulted in higher spore counts than in untreated controls. More extended treatment--that is, 60-80 minutes--had a very noticeable killing effect on the spores. The most generally observed effect of combining insonation with irradiation was an enhancement of the killing effect of the ionizing radiation, even under those conditions which did not produce noticeable killing by the insonation alone.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

SCTM-192-62(72) OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
MYLAR BELTING IN MINIATURE POWER TRANSMISSIONS, by Dean E. Gladow. Aug 62, 20p
Contract AT(29-1)789

EURAEC-292 OTS $1.10

Stanray Corp., Chicago, Ill.
DESIGN AND ECONOMIC STUDY OF SPENT FUEL SHIPPING. Quarterly rept. no. 4, 1 Jan-31 Mar 62, by Gerald Fisher. 26 Mar 62, 7p
Contract AT(11-1)963

Engines and Propulsion Systems

NASA N63-19964 OTS $19.75

Bell Aerosystems Co., Buffalo, N. Y.
STUDY OF ZERO-GRAVITY POSITIVE EXPULSION TECHNIQUES. Interim rept., 16 Apr 62-15 Feb 63, by L. Thompson and I. De Puy. Jun 63, 321p 109refs
Contract NAS7-149
Rept. no. 8230-933004; NASA CR-50774

NASA N63-12521 OTS $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE DESIGN AND CASCADE TESTS OF FREE-STREAMLINE AND FULL-CONTOUR 160° TURNING SUPERSONIC-TURBINE-BLADE SECTIONS, by Willard R. Westphal. 16 Aug 57, declassified 14 Sep 62. 24p 1ref
Research memo RM L57F21

NASA N63-12507 OTS $4.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYSIS OF LIMITATIONS IMPOSED ON ONE-SPOOL TURBOJET-ENGINE DESIGNS BY TURBINES HAVING DOWNSTREAM STATORS AT 0, 2.0, AND 2.8 FLIGHT MACH NUMBERS, by Richard H. Cavicchi and Anita B. Constantine. 19 Jan 55, declassified 1 Dec 62. 50p 3refs
Research memo RM E54J14

NASA N63-12512 OTS $3.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYTICAL INVESTIGATION OF FUEL-COOLED TURBINE BLADES WITH RETURN-FLOW TYPE OF FINNED COOLANT PASSAGES, by Alfred J. Nachtigall and Henry O. Slone. 26 Jun 57, declassified 14 Sep 62, 38p 10refs
Research memo RM-E57D03

NASA N63-12538 OTS $1.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
CALCULATED PERFORMANCE OF A MERCURY-COMPRESSOR-JET POWERED AIRPLANE USING A NUCLEAR REACTOR AS AN ENERGY SOURCE, by R. B. Doyle, 26 Sep 51, declassified 14 Sep 62. 17p 4refs
Research memo. RM-E51F14

NASA N63-16235 OTS $6.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECTS OF SOME CONFIGURATION CHANGES ON AFTERBURNER COMBUSTION PERFORMANCE, by Shigeo Nakanishi and Charles R. King. 12 Jun 57, declassified 18 Apr 63. 61p 10refs
NACA-RM-E57C01

NASA N63-16236 OTS $7.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL INVESTIGATION OF EFFECTS OF COMBUSTION-CHAMBER LENGTH AND INLET TOTAL TEMPERATURE, TOTAL PRESSURE, AND VELOCITY ON AFTERBURNER PERFORMANCE, by Charles R. King. 3 Jun 57, declassified 18 Apr 63, 79p 14refs
NACA-RM-E57C07

NASA N63-12547 OTS $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INVESTIGATION OF A 0.6 HUB-TIP RADIUS-RATIO TRANSONIC TURBINE DESIGNED FOR SECONDARY-FLOW STUDY. II. DESIGN AND EXPERIMENTAL PERFORMANCE OF TURBINE WITH LOW-VELOCITY-TURNING STATOR AND STANDARD ROTOR, by Harold E. Rohlik, William T. Wintucky, and Herbert W. Scibbe. 18 Jul 57, declassified 23 Apr 62. 29p 4refs
Research memo RM-E57E09

NASA N63-16233 OTS $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INVESTIGATION OF EFFECT OF NUMBER AND WIDTH OF ANNULAR FLAME-HOLDER GUTTERS ON AFTERBURNER PERFORMANCE, by James G. Henzel, Jr. and Lively Bryant. 3 Jun 54, declassified 18 Apr 63. 27p 4refs
NACA-RM-E54C30

NASA N63-12546 OTS $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INVESTIGATION OF A 0.6 HUB-TIP RADIUS-RATIO TRANSONIC TURBINE DESIGNED FOR SECONDARY-FLOW STUDY. III. EXPERIMENTAL PERFORMANCE WITH TWO STATOR CONFIGURATIONS DESIGNED TO ELIMINATE BLADE WAKES AND SECONDARY-FLOW EFFECTS AND CONCLUSIONS FROM ENTIRE STATOR INVESTIGATION, by Harold E. Rohlik, William T. Wintucky, and Thomas P. Moffitt. 17 Sep 57, declassified 23 Apr 62, 28p 4refs
Research memo. RM E57G08

NASA N63-16234 OTS $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PERFORMANCE OF A SHORT COMBUSTOR AT HIGH ALTITUDES USING HYDROGEN FUEL, by Joseph N. Sivo and David B. Fenn. 7 Aug 56, declassified 18 Apr 63 21p 2refs
NACA-RM-E56D24

NASA N63-12536 OTS $3.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ROCKET ENGINE STARTING WITH MIXED OXIDES OF NITROGEN AND LIQUID AMMONIA BY FLOW-LINE ADDITIVES, by George R. Kinney, Jack C. Humphrey, and Glen Hennings. 19 Aug 53, declassified 14 Sep 62. 32p 11refs
Research memo RM E53F05

MATERIALS

AD-286 522 OTS $8.10

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
HIGH-COMPRESSIVE-STRENGTH CONCRETE. A REVIEW OF THE STATE OF THE ART, by Bryant Mather. Aug 62, 87p 70refs
Contract AF 29(601)6104
WES Miscellaneous paper no. 6-520; AFSWC-TDR-62-56

DESCRIPTORS: *Concrete, *Compressive properties, Pressure, Stresses, Cements, Economics, Production, Literature, *Reviews, Materials.

This report presents the results of a review of relevant published and unpublished data pertaining to high-strength concrete, including consideration of factors affecting strength; high-strength concretes previously made; and applications, economics, and procurement of high-strength concrete. The data reviewed indicate that the practical, routine production of portland-cement concrete having a compressive strength consistently above 10,000 psi after 90 days moist-curing will require careful selection of materials; mixture proportions; and mixing, placing, consolidating, and curing procedures. The most important single factor affecting the producibility of such concrete is the achievement of an adequately low water-cement ratio.

BMI-1635 OTS $0.50

Battelle Memorial Inst., Columbus, Ohio.
FISSION-FRAGMENT-INDUCED STRESSES IN CERAMIC MATERIALS, by Thomas S. Elleman, Robert B. Price, and Duane N. Sunderman. 4 Jun 63, 24p 10refs
Contract W7405-eng-92

AD-408 281 repriced OTS $1.50

Quartermaster Research and Engineering Command, Natick, Mass.
WEAR RESISTANCE OF MILITARY TEXTILES, by Louis I. Weiner. Mar 63, 59p 31refs
Textile Series rept. no. 125

DESCRIPTORS: *Textiles, Wear resistance, Test methods, Abrasives, Friction, Fibers, Cotton textiles, Woolen textiles, Fibers (Synthetic), Clothing, Nylon

This report is a survey of recent work on the wear resistance of military textiles. It summarizes studies made on test methods and wear mechanisms, and includes the results of some practical wear trials. Two new instruments are described. One measures the snagging resistance of textiles and the other measures an 'abrasive' type of wear action which appears to correlate with combat usage. Wear trials on cotton, wool, and blended fabrics are described and the status of correlation studies of laboratory and field wear are reviewed. (Author)

PB 163 298 OTS $9.10

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART III: CHARACTERISTICS OF PAPER HONEYCOMB UNDER DYNAMIC LOADING, by James W. Turnbow, Hudson Matlock, and J. Neils Thompson. 31 Aug 56, 104p 11refs.
Contract DA 19-129-qm-150, continuation of Contract DA 11-009-qm-19309

DESCRIPTORS: *Air drop operations, *Packing materials, Paper, *Honeycomb cores, Load distribution, Mechanical properties.

The dynamic stress-strain curves of seven grades of paper honeycomb and the associated characteristic values relating to aerial delivery applications are presented. The effects of impact velocity and density of the honeycomb material on the stress-strain characteristics are given. Tabulated values of maximum stress, optimum strain and energy absorption are presented and a comparison of the various honeycomb materials is made on the basis of cost per unit of energy absorbed. As an aid to the understanding of the overall air-drop energy-absorption problem, the economic importance of using cushioning materials of a crushable nature, or equivalent energy-absorbing devices, in conjunction with aerial retarders is summarized. The capabilities of paper honeycomb are illlustrated further by the presentation of a cost analysis for the energy absorption in a typical air-drop. Recommendations for the future study and testing of paper honeycomb as well as other materials and systems potentially even more efficient than honeycomb are discussed. (Author)

PB 163 299 OTS $3.60

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART IV: THEORETICAL ANALYSIS OF A LANDING SNUBBER FOR USE WITH PARACHUTES, by Walter L. Moore and Carl W. Morgan 21 Nov 56, 38p 4 refs
Contract DA 19-129-qm-150

DESCRIPTORS: *Air drop operations, *Packing materials, Shock resistance, Parachutes, Landing impact, Vibration isolators

This report describes the characteristics of a landing snubber and presents a theoretical analysis of its operation. The concept of a landing snubber is a new one in the field of devices to control the landing shock on supplies and equipment dropped from the air. A device based on this concept would abruptly draw together a parachute and its suspended load just before ground contact thereby reducing the impact velocity to a safe value. The apparent advantages and disadvantages of the landing snubber are discussed. (See also PB 163 298)

PB 163 300 OTS $6.60

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART V: THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF FLUID-FILLED METAL CYLINDERS FOR USE AS ENERGY ABSORBERS ON IMPACT, by Carl W. Morgan and Walter L. Moore. 20 Dec 56, 66p 2refs
Contract DA 19-129-qm-150

DESCRIPTORS: *Air drop operations, *Packing materials, *Metals, Shock resistance, Theory, Tests

The design, construction and testing of energy absorbers utilizing metal cylinders either empty or fluid-filled is described. Energy is absorbed in the crumpling of the metal walls and in imparting kinetic energy to the contained fluid as it is discharged through properly designed orifices in the walls of the container. An equation is derived for the area and spacing of orifices required to maintain a constant retarding force due to liquid pressure during the crushing of the cylinders. The design of the fluid-filled cylinders is based on this constant retarding force in addition to the force required to crumple the walls of the empty cylinder. The predicted performance of these energy absorbers is shown to be verified by free-fall dynamic tests. The resisting force and the energy absorbed as computed from the force-displacement curves are given. Seamless steel and aluminum tubing, commercial sheet steel cans, and cylinders formed from galvanized sheet steel were tested. A comparison of the various materials is made on the basis of cost per unit of energy absorbed. (Author)(See also PB 163 299)

PB 163 301 OTS $4.60

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART VI: PRELIMINARY INVESTIGATION OF THE ABSORPTION OF SHOCK ENERGY BY WOOD IN LATERAL COMPRESSION, by Ahmin Ali and Hudson Matlock.
18 Mar 57, 43p 3refs
Contract DA 19-129-qm-150
AD-132 863

DESCRIPTORS: *Air drop operations, *Packing materials, *Wood, Shock resistance, Compressive properties, Feasibility studies

In addition to tests to determine the feasibility of using wood in lateral compression, a few exploratory tests were made using wood in combination with steel wire in tension. Devices designed especially for repeated use in testing were utilized, and a limited number of tests were made to give an indication of the quality of energy absorbed under these conditions. The force-displacement curves obtained from free-fall tests are shown. The cost of absorbing impact energy is based on the cost of the materials only, and does not include the cost of devices used to apply the loads. The tests indicate that it is feasible to use wood in lateral compression to absorb the shock energy of impact efficiently and economically; the cost for energy absorption

for wood is $0.00003/ft-lb as compared to $0.000015/ft-lb for paper honeycomb. The type of surface, wedge-shaped for cylindrical, which is used for compressing the wood has an influence on the energy absorption. The force level at which the energy is absorbed appears to be affected by the amount of lateral compression, though not in direct ratio as friction seems to play a significant part in the absorption of shock energy. (DDC abstract) (See also PB 163 300)

PB 163 302 OTS $4.60

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART VII: CHARACTERISTICS OF FOAMED PLASTICS UNDER DYNAMIC LOADING, by James W. Turnbow. 28 Mar 57, 44p
Contract DA 19-129-qm-150

DESCRIPTORS: *Air drop operations, *Packing materials, *Expanded plastics, Load distribution, Mechanical properties

This is a preliminary report devoted to the presentation and discussion of the dynamic stress-strain curves of four foamed plastic materials, including a polyisocyanate-resin suitable for field expansion without the aid of curing ovens or other special equipment. Static stress-strain curves are also presented to provide a comparison with the dynamic test results. Additional curves and tables give energy-absorption characteristics, stress levels, and suggested operating limits for the use of these materials in aerial delivery cushioning. Further comparisons of the plastic materials with paper honeycomb are presented with emphasis on cushioning costs and energy absorption capabilities. (Author) (See also PB 163 301)

PB 163 303 OTS $6.60

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART VIII: DYNAMIC STRESS-STRAIN CHARACTERISTICS OF VARIOUS MATERIALS, by Ahmin Ali. 3 June 57, 60p 6refs
Contract DA 19-129-qm-150
AD-141 943

DESCRIPTORS: *Air drop operations, *Packing materials, Mechanical properties, Shock resistance.

In the delivery of supplies from aircraft in flight, cushioning materials are needed for absorbing the shock energy on impact with the ground. The capability of a material for absorbing impact energy can best be evaluated from the dynamic stress-strain curve for that material. Under the title contract, a survey has been made of the cushioning materials available, and materials exhibiting a wide range of physical properties were tested. Dynamic stress-strain curves, along with some static stress-strain curves, are presented for these cushioning materials. Some of the data presented were taken from other sources. The evaluation of dynamic stress-strain curves is discussed briefly to indicate the type of material necessary for efficient and economical absorption of impact energy. (Author) (See also PB 163 302)

PB 163 304 OTS $5.60

Structural Mechanics Research Lab., U. of Texas, Austin.
CUSHIONING FOR AIR DROP, PART IX: BIBLIOGRAPHY OF LITERATURE PERTAINING TO THE ABSORPTION OF IMPACT ENERGY. Final rept by Ahmin Ali and Leonard R. Benson. 9 June 57, 52p 97refs
Contract DA 19-129-qm-150
AD-141 944

DESCRIPTORS: *Air drop operations, *Packing materials, Shock resistance, *Bibliographies

The report consists of an annotated bibliography of literature dealing with all phases of the problem of the absorption of impact energy in the air drop of supplies and equipment. Included in this survey are pertinent articles in the following phases: (1) Theory and design of cushioning, (2) Economics of energy-absorbing systems, (3) Materials, devices, and systems which may be available, (4) Dynamic test facilities and procedures for investigation of energy absorbers, and (5) Results obtained from actual dynamic laboratory and field tests. (Author) (See also PB 163 303)

Fuels, Lubricants, and Hydraulic Fluids

PB 163 357 OTS $5.60

[Chemical Propulsion] Information Agency, Applied Physics Lab. (JHU), Silver Spring, Md.
METHOD FOR DETERMINING THE TENSILE PROPERTIES OF SOLID ROCKET PROPELLANTS. PART I: NITROCELLULOSE BASE PROPELLANTS. Mar 56, 59p 7refs
Contract NOrd-7386
SPIA/PP8

DESCRIPTORS: *Solid rocket propellants, *Nitrocellulose, Tensile properties, *Rocket propellants, Determination, Statistical data.

A standard method has been established for determining the tensile properties of nitrocellulose base solid rocket propellants to eliminate the confusion that has resulted from the multiplicity of methods that have been used by various agencies in the past and to provide a practical reference for new investigators in this field. The method has been designed primarily for rapid routine work and recommends the use of solid dumbbell shaped specimens that can be machined from cylinders 3 inches in length and 1 inch in diameter. A strain rate of 0.1 in/min/in and a temperature of 77°F are used as standard reference conditions, and any testing machine can be used that will enable maintenance of the necessary rate. An inter-agency "round robin" testing program was carried out to evaluate the general applicability of the recommended method and to investigate the probable reproducibility to be expected in the test results.

PB 163 358 OTS $1.60

[Chemical Propulsion] Information Agency, Applied Physics Lab. (JHU), Silver Spring, Md.
METHOD FOR DETERMINING THE TENSILE PROPERTIES OF SOLID ROCKET PROPELLANTS. PART II: COMPOSITE PROPELLANTS. Feb 57, 20p 4refs
Contract NOrd-7386
SPIA/PP8

DESCRIPTORS: *Solid rocket propellants, Tensile properties, *Rocket propellants, Determination, Statistical data, *Ammonium compounds, *Perchlorates, *Nitrates, Composite materials.

A standard low-rate tensile test procedure has been established for testing composite propellants. The procedure prescribes a standard tensile specimen and methods for specimen preparation, conditioning and testing. The tensile specimen has a 2.0 inch gage section with a rectangular cross-section and can be prepared either by milling, diecutting or casting. Tensile specimens must be conditioned for 3 hours at 77 ± 2°F. and then tested at 77 ± 2°F. at a crosshead speed of 2.0 inches/minute. It is recommended that the conditioning be at 50% relative humidity for ammonium perchlorate composites and at 20% relative humidity for ammonium nitrate composites. Strain and modulus values must be calculated using an effective gage length instead of the actual gage length of the tensile specimen. (Author) (See also PB 163 357)

NASA N63-12542 OTS $8.10

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PERFORMANCE OF PENTABORANE, PENTABORANE-JP-4 FUEL MIXTURES, AND TRIMETHYLBORATE AZEOTROPE FUEL IN A FULL-SCALE TURBOJET ENGINE, by Roland Breitwieser and James W. Useller. 20 Nov 56, declassified 14 Sep 62 83p 21refs
Research memo RM E56G19

PB 163 655 OTS $3.60

[New York U. Coll. of Engineering, N. Y.].
A DYNAMICAL MODEL OF THE BURNING OF A SOLID PROPRLLANT. Final rept. on Macrosonic Combustion, by George E. Hudson. [1961] 36p
Contract [Nonr-3155(00)] Subcontract to Cleveland Pneumatic Industries, Inc.

DESCRIPTORS: Models (Simulations), *Combustion, *Propellants, Acoustics, Pressure, Stability, Dynamics, Solid rocket propellants.

A dynamical model of the burning of a particular type of solid propellant is formulated and analyzed. A steady state solution is developed and computations are made concerning this behavior. The stability of the model to small external pressure perturbations is examined, and it is found to be stable over the entire frequency spectrum. (Author)

TID-18117 OTS $5.60

Atomics International, Canoga Park, Calif.
SAIL, by B. J. Lemke. Feb 61, 56p
Contract AT(11-1)GEN-8

WAPD-TM-367 OTS $2.00

Bettis Atomic Power Lab., Pittsburgh, Pa.
THE PEACEMAN-RACHFORD METHOD FOR SMALL MESH INCREMENTS, by Willis H. Guilinger, Jr. Mar 63, 80p 17refs
Contract AT(11-1)GEN-14

BNL-6729 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
MATHEMATICS OF INTERMITTENT IRRADIATION, by F. B. Hill. Oct 62, 37p 20refs
Contract AT(30-2)GEN-16

PB 163 309 OTS $3.60

Electronics Research Lab., U. of California, Berkeley.
ON THE GENERATION OF MARKOV CHAINS, by J. F. A. Ormsby. 29 Aug 62, 38p 6refs
Grant G-15965
IER series no. 60, issue no. 480

DESCRIPTORS: *Probability, Measure theory, Applied mathematics.

The work in the present report uses the necessary and sufficient condition based on conditional probabilities to verify the existence of a Markov chain of any order with a countable state space and describes the form of the f mapping sufficient for this generation and for stationarity as well.

ORNL-3428 OTS $0.50

Oak Ridge National Lab., Tenn.
AN IBM-7090 SUBROUTINE PACKAGE FOR LANGRANGIAN INTERPOLATION, by S. K. Penny and M. B. Emmett. 1963, 8p
Contract W7405-eng-26

SCR-222A OTS $0.75

Sandia Corp., Albuquerque, N. Mex.
A SIMPLE ASYMPTOTICALLY CHI-SQUARE STATISTIC FOR DISTRIBUTIONS OF RUNS, by Stoughton Bell. Apr 63, 29p 18refs
Contract AT(29-1)789
SCR-222, rev.

NASA N63-19947 OTS $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
PERTURBATION THEORY FOR ILLUSTRATION PURPOSES, by Egil A. Hylleraas. 9 Jul 63, 15p
Grant NsG-275-62(4180)
WIS-TCI-23; NASA CR-50776

WAPD-TM-365 OTS $2.00

Bettis Atomic Power Lab., Pittsburgh, Pa.
BETTIS FORTRAN PROGRAMMING: AUXILIARY SUBROUTINES, by O. J. Marlowe. Feb 63, 85p 4refs
Contract AT(11-1)GEN-14

WAPD-TM-356 OTS $1.00

Bettis Atomic Power Lab., Pittsburgh, Pa.
A FORTRAN PROGRAM TO SOLVE THE P-3 GAMMA RAY EQUATIONS IN SLAB GEOMETRY, by W. D. Lanning. Apr 63, 41p 14refs
Contract AT(11-1)GEN-14

LADC-5639 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
USE OF THE DISK FILE ON STRETCH, by B. G. Carlson and E. A. Voorhees. 1 Feb 63, 11p
Contract W7405-eng-36

NLCO-868 OTS $2.60

National Lead Co. of Ohio, Cincinnati.
A TRAVELOG OF ANALOGS, by J. A. Williamson 8 Feb 63, 26p.
Contract AT(30-1)1156

OTS SB-407, Revised $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
LINEAR PROGRAMMING. Jun 63, 14p 141refs
OTS Selective Bibliography SB-407, rev.

DESCRIPTORS: *Data processing systems, *Programming (Computers), Linear systems, *Bibliographies, *Linear programming.

List 141 domestic and foreign references to reports added to the OTS collection during the period 1950 to June 1963. Covers symposia, models for budgeting and financial planning, personnel data exploitation, decision rules for product and employment scheduling, inventory control, warehousing and transportation models among other subject. (Author)

SCTM-251-62(24) OTS $2.60

Sandia Corp., Albuquerque, N. Mex.
CODING OBJECTS FOR SELF-ORGANIZATION, by George R. Wilde. Dec 62, 26p 14refs
Contract AT(29-1)789

TID-17944 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
COMPUTER APPLICATIONS IN QUALITY CONTROL OPERATIONS, by Thomas D. Harrison. Feb 63, 14p 29refs
Contract AT(29-1)789

PB 181 547 OTS $0.75

Ghent U. (Belgium).
LOW-STRESS BRITTLE FRACTURE IN MILD STEEL, by R. Dechaene, W. Soete, and A. Vinckier. 30 Aug 63, 23p. 12 refs. Special rept. SSC-158.

DESCRIPTORS: *Steel, *Fracture (Mechanics), *Ship plates, Creep, Stresses, Brittleness, Welding.

Contents:
Delineation of the problem
Measurements of plastic strains in cracked plates
Behavior of cracked plates
Behavior of embrittled steel
Behavior of the welded wide plate
Further research
References

UCRL-13064 OTS $11.50

Institute of Engineering Research, U. of California, Berkeley.
ANALYSIS OF STRESS CONCENTRATIONS IN THIN SPHERICAL SHELLS, by M. K. S. Rajan, J. Penzien, and E. P. Popov. Dec 62, 160p 11refs
Series 100, issue 22

NASA N63-19733 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A SIMPLIFIED METHOD OF DETERMINING THE ELASTIC STATE OF THERMAL STRESS IN A THIN, FLAT PLATE OF FINITE DIMENSIONS, by Ernest Roberts, Jr. and Alexander Mendelson. Aug 63, 24p (NASA TN-D-1740)

LAMS-2882 OTS $1.75

Los Alamos Scientific Lab., N. Mex.
SOME APPROXIMATE CALCULATIONS OF THE WALL PRESSURE PROFILE FOR THE CASE OF A CHAPMAN-JOUQUET DETONATION IN A FINITE MASS OF HIGH EXPLOSIVE ADJACENT TO A RIGID WALL, by Kenneth A. Meyer. 20 Jun 63, 74p 5refs
Contract W7405-eng-36

NASA N63-17485 OTS $8.10

Michigan U. Coll. of Engineering, Ann Arbor.
DETAILED INVESTIGATION OF CAVITATION PITTING CHARACTERISTICS FROM CAVITATING VENTURI TESTS, Technical rept. no. 8, by Lawrence L. Barinka and Frederick G. Hammitt. Apr 63, 87p 18refs
Grant NsG-39-60
Rept. no. 03424-8-1; NASA CR-50241.

RM-1363 OTS $3.60

Rand Corp., Santa Monica, Calif.
NUMERICAL SOLUTIONS OF SPHERICAL BLAST WAVES, by H. L. Brode. 29 Sep 54, 40p 9refs
Contract AT(29-1)1477

SCTM-87-62(73) OTS $5.60

Sandia Corp., Albuquerque, N. Mex.
THEORY AND SPECIFICATIONS FOR SHOCK TESTING, by R. I. Butler. July 62, 53p
Contract AT(29-1)789.

SCTM-214-62(13) OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
TRANSVERSE VIBRATIONS OF TAPERED CANTILEVER BEAMS, by H. H. Mabie. Sep 62, 14p
Contract AT(29-1)789

Aerodynamics and Pneumatics

NASA N63-13914 repriced OTS $1.75

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE SUBSONIC AERODYNAMIC CHARACTERISTICS OF SOME BLUNT DELTA CONFIGURATIONS WITH 75° SWEEPBACK, by George G. Edwards and Howard F. Savage. Oct 61, declassified 8 Feb 63. 65p 3refs
Technical memo. X-581

NASA N63-17989 OTS $4.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
WIND-TUNNEL INVESTIGATION OF THE STATIC AND DYNAMIC-ROTARY STABILITY DERIVATIVES OF A FLAT-TOP WING-BODY MODEL AT MACH NUMBERS OF 2.5, 3.0, AND 3.5, by Bedford A. Lampkin and Kenneth C. Endicott. Apr 60, 42p 9refs
Technical memo no. X-361

PB 163 361 OTS $12.00

Institute of Research, Lehigh U., Bethlehem, Pa.
AN EXPERIMENTAL STUDY OF TURBULENT SPOTS AND WALL ROUGHNESS EFFECTS IN SHOCK TUBE BOUNDARY LAYER TRANSITION. Technical rept. no. 16, 1960-1963, by William Paul Thompson, Jr., Doctoral thesis. 15 Jun 63, 162p 77refs
Grant G-6350
NASA N63-18382

DESCRIPTORS: *Shock tubes, *Boundary layer transition, *Turbulence, Friction, Shock waves, Reynolds number, Laminar boundary layer, Oscillation, Test equipment, Test methods, Tests

Turbulent spots have been identified as a transition mechanism in shock tube boundary layer flows for a range of weak shocks at initial pressures near one atmosphere in air, using thin-film wall temperature gauges. A study of turbulent spots generated by sparks set off in the boundary layer, and of flow tripping by two- and three-dimensional roughness elements, has indicated the existence of a completely stable interval behind the shock, in which finite disturbances will not cause flow breakdown or transition to turbulent flow. The data are best correlated by a Reynolds number based on boundary layer velocity thickness δ. The upper limit of the stable region, the origins of naturally and artificially produced turbulent spots, and the origin of turbulence induced by roughness elements, all fall in the Reynolds number range $Re_\delta = 1.0$ to 4.0×10^3, over a shock Mach number range 1.1 to 2.3. The ultimate persistence of laminar flow in the present experiments was limited by voundary layer tripping at wall discontinuities.

NASA N63-16237 OTS $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMICS OF OSCILLATING CONTROL SURFACES AT TRANSONIC SPEEDS, by Robert F. Thompson and Sherman A. Clevenson. 17 Jun 57, declassified 18 Apr 63. 19p 16refs
NACA-RM-L57D22b

NASA N63-16240 OTS $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
CALCULATION OF EXTERNAL-STORE LOADS AND CORRELATION WITH EXPERIMENT, by Percy J. Bobbitt, Harry W. Carlson, and Albin O. Pearson. 29 Jul 57, declassified 18 Apr 63. 21p 32refs
NACA-RM-L57D30a

NASA N63-16139 OTS $4.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE EFFECT OF AIR BLEED ON THE HEAT TRANSFER AND PRESSURE DISTRIBUTION ON 30° CONICAL FLARES AT A MACH NUMBER OF 6.8, by Davis H. Crawford. Mar 61, declassified 18 Apr 63. 48p 29refs
NASA TM X-439

NASA N63-17165 OTS $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF VERTICAL-TAIL MODIFICATIONS ON THE STATIC STABILITY CHARACTERISTICS AT A MACH NUMBER OF 2.2 OF A SUPERSONIC VTOL AIRPLANE MODEL HAVING A BROAD FUSELAGE AND SMALL DELTA WINGS, by Ross B. Robinson and M. Leroy Spearman. 1 Apr 61, 18p 1ref
Technical memo no. X-519

NASA N63-16138 OTS $3.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE EFFECTS OF WING PLAN FORM ON THE STATIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A FLAT-TOP HYPERSONIC AIRCRAFT AT MACH NUMBERS FROM 0.6 TO 1.4, by Stuart L. Treon. Apr 60, declassified 18 Apr 63. 32p 14refs
NASA TM X-364

NASA N62-72002 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPLORATORY INVESTIGATION AT MACH NUMBER OF 2.01 OF THE LONGITUDINAL STABILITY AND CONTROL CHARACTERISTICS OF A WINGED RE-ENTRY CONFIGURATION, by Gerald V. Foster. Dec 59, declassified 8 Dec 61. 21p. 2 refs.
Technical memo. X-178

NASA N63-16238 OTS $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FACTORS AFFECTING LOADS AT HYPERSONIC SPEEDS, by Arthur Henderson, Jr. and Mitchell H. Bertram. 19 Jun 57, declassified 18 Apr 63, 23p 19refs
NACA-RM-L57D25a

NASA N63-19607 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FREE-FLIGHT INVESTIGATION OF THE DEPLOYMENT, DYNAMIC STABILITY, AND CONTROL CHARACTERISTICS OF A 1/2-SCALE DYNAMIC RADIO-CONTROLLED MODEL OF A LARGE BOOSTER AND PARAWING, by Sanger M. Burk, Jr. Aug 63, 20p 7refs
NASA TN D-1932

NASA N63-19736 OTS $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FULL-SCALE WIND-TUNNEL INVESTIGATION OF A FLEXIBLE-WING MANNED TEST VEHICLE, by Joseph L. Johnson, Jr. and James L. Hassell, Jr. Aug 63, 73p 7refs
NASA TN D-1946

NASA N63-16241 OTS $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT-TRANSFER MEASUREMENTS ON A CONCAVE HEMISPHERICAL NOSE SHAPE WITH UNSTEADY-FLOW EFFECTS AT MACH NUMBERS OF 1.98 AND 4.95, by Morton Cooper, Ivan E. Beckwith, Jim J. Jones, and James J. Gallagher. 17 Jul 58, declassified 18 Apr 63. 21p 6refs
NACA RM-L58D25a

NASA N63-19604 OTS $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF PROPELLER-POWER-PLANT AUTOPRECESSION BOUNDARIES FOR A DYNAMIC-AEROELASTIC MODEL OF A FOUR-ENGINE TURBOPROP TRANSPORT AIRPLANE, by Frank T. Abbott, Jr. H. Neale Kelly and Kenneth D. Hampton. Aug 63, 68p 6refs
NASA TN D-1806

NASA N63-16239 OTS $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOADS DUE TO CONTROLS AT TRANSONIC AND LOW SUPERSONIC SPEEDS, by F. E. West, Jr. and K. R. Czarnecki. 7 Jun 57, declassified 18 Apr 63. 15p 11refs
NACA-RM-L57D26a

NASA N63-19737 OTS $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LOW-SPEED INVESTIGATION OF THE EFFECTS OF WIND SWEEP ON THE AERODYNAMIC CHARACTERISTICS OF PARAWINGS HAVING EQUAL-LENGTH LEADING EDGES AND KEEL, by Rodger L. Naeseth and Thomas G. Gainer. Aug 63, 79p 16 refs
NASA TN D-1957.

NASA N63-16136 OTS $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
PERFORMANCE OF A MACH NUMBER 3.0 DESIGN AXISYMMETRIC DOUBLE-CONE EXTERNAL-COMPRESSION INLET IN THE MACH NUMBER RANGE 1.97 to 0.79, by Owen H. Davis and Glenn A. Mitchell. Apr 60, declassified 18 Apr 63. 30p 5refs
NASA TM X-154

NASA N63-16140 OTS $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STABILITY AND CONTROL CHARACTERISTICS AT A MACH NUMBER OF 2.01 OF A SUPERSONIC VTOL AIRPLANE MODEL HAVING A BROAD FUSELAGE AND SMALL DELTA WINGS, by Cornellius Driver and M. Leroy Spearman, Feb 61, declassified 18 Apr 63. 28p
NASA TM X-441

NASA N62-70296 OTS $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRANSONIC AERODYNAMIC CHARACTERISTICS OF A 45° SWEPT-WING - FUSELAGE MODEL WITH A FINNED AND UNFINNED BODY PYLON-MOUNTED BENEATH THE FUSELAGE OR WING, INCLUDING MEASUREMENTS OF BODY LOADS, by Dewey E. Wornom. May 59, declassified 29 May 61. 57p 9 refs
NASA MEMO 4-20-59L.

NASA N63-16137 OTS $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A TRANSONIC WIND-TUNNEL INVESTIGATION OF THE STATIC LONGITUDINAL AND LATERAL AERODYNAMIC CHARACTERISTICS OF A PROPOSED HYPERSONIC GLIDER WITH SEVERAL BOOSTER CONFIGURATIONS, by Ralph P. Bielat Dec 60, declassified 18 Apr 63, 39p 3refs
NASA TM X-345

NASA N63-14757 repriced OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 1.60 TO 4.50 OF THE STATIC-STABILITY CHARACTERISTICS OF TWO NONLIFTING VEHICLES SUITABLE FOR REENTRY, by Kenneth L. Turner and David S. Shaw. Mar 59, declassified 12 Mar 63. 35p NASA MEMO 3-2-59L.

NASA N63-17990 OTS $2.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL INVESTIGATION OF STATIC AERODYNAMIC CHARACTERISTICS OF A 1/9-SCALE MODEL OF A PROJECT MERCURY CAPSULE AT MACH NUMBERS FROM 1.60 TO 4.65, by David S. Shaw and Kenneth L. Turner. Jul 60, 27p 6refs Technical memo no. X-291.

PB 163 496 OTS $2.60

Nepa [Div.] Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
AN APPROXIMATE METHOD FOR ESTIMATING THE TOTAL-PRESSURE LOSS FOR FLOW OF AIR THROUGH TUBES WITH HEATING AND FRICTION, by M. L. Lesser. Jun 47, rev. 15 Jul 47, 23p 10refs NEPA 249-EDR-5; Technical rept. no. DR-1

DESCRIPTORS: *Numerical methods and procedures, *Gas flow, Pipes, Heating, Friction, *Pressure, Measurement, Equations of state, Mathematical analysis

The method is based on the assumption that the equation of state of the gas, as it flows through the tube, can be approximated by a polytropic process, the value of the polytropic exponent being determined by the entrance and exit conditions. Using this assumption, it is shown that the total-pressure loss is an implicit function of the mass flow through the tube, the total pressure and stagnation temperature just in front of the tube entrance, the ratio of the stagnation temperature at the exit and entrance to the tube, and the geometry of the system. A working chart is presented for the rapid estimation of the pressure loss explicitely in terms of the variables mentioned above for the geometry of a bundle of tubes filling a straight duct. As the chart takes the entrance and exit effects into account, it is only valid for a free-flow area ratio of 0.5 in the tubes.

METALLURGY

PB 163 467 OTS $1.10

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING OF REFRACTORY METALS. Progress rept. no. 6, 1 Dec 61-31 Jan 62, by H. L. McKaig, Jr. 30 Mar 62, 2p 1ref
Contract NOw-61-0410-c

DESCRIPTORS: *Heat resistant metals and alloys, Refractory materials, *Molybdenum alloys, *Titanium alloys, *Tungsten, *Welding, *Ultrasonic radiation, *Non-destructive testing

A search for a reliable, quick, simple, and inexpensive inspection technique was initiated and continued. A temperature-indicating liquid technique is in the process of evaluation. Ultrasonic inspection, if feasible, would be an ideal solution. Branson Instruments, reported that ultrasonic inspection did not appear promising. Sperry Products Company, reported some success in using surface waves and a frequency of 5-mc to locate internal flaws after the welds were sheared off. (See also AD-271 377)

GA-3724 OTS $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
EFFECT OF NEUTRON IRRADIATION ON MATERIALS SUBJECTED TO MULTIAXIAL STRESS DISTRIBUTIONS, Quarterly rept for period ending 30 Sep 62, by T. A. Trozera. 6p

GA-3882 OTS $1.10

General Atomic Div., General Dynamics Corp., San Diego, Calif.
EFFECT OF NEUTRON IRRADIATION ON MATERIALS SUBJECTED TO MULTI-AXIAL STRESS DISTRIBUTIONS, Quarterly rept for period ending 31 Jan 63, by T. A. Trozera 13 Feb 63, 6p 3refs
Contract AT(04-3) 167

GA-3349 OTS $1.25

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A STUDY OF COPPER OXIDATION AND SOME IRRADIATION EFFECTS. Final rept. by J. Martin Tobin. 6 Feb 63, 45p 22refs
Contract AT(04-3)407

ARF-B198-36 OTS $1.10

IIT Research Inst., Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS. Quarterly rept. 1 Oct-31 Dec 62, by D. Weinstein and F. C. Holtz. 10 Jan 63, 10p
Contract AT(11-1)578
EURAEC-554

NASA N63-16548 OTS $4.60

Lockheed Nuclear Products, Marietta, Ga.
EFFECT OF NUCLEAR RADIATION ON MATERIALS AT CRYOGENIC TEMPERATURES. Quarterly progress rept. no. 7, Jul-Sep 62. [1962] 42p
Contract NASw-114
ER-6047; NASA CR-50056; NP-12501

NMI-1254 $7.60

Nuclear Metals, Inc., West Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. RESEARCH ON THE MECHANISM OF ZIRCONIUM ALLOY CORROSION IN HIGH-TEMPERATURE STEAM. PART A. CRACKING OF THICK OXIDE FILMS ON ZIRCONIUM ALLOYS IN HIGH-TEMPERATURE STEAM. PART B. MODIFICATION OF SURFACE OXIDE FILMS ON ZIRCONIUM. Summary technical rept. 1 Jul 61-30 Jun 62, by D. S. Kneppel, J. P. Pemsler, and A.G. Tobin. 25 Feb 63, 71p
Contract AT(30-1)2784

AD-408 570 repriced OTS $2.75

Southwest Research Inst., San Antonio, Tex.
CONTAMINATION EFFECTS ON LIQUID RUBIDIUM AND LIQUID LITHIUM SYSTEMS. Final rept., 1 May 62-15 Apr 63, by W. D. Rutherford, Jr., Robert K. Johnston, M. L. Valtierra, and J. W. Rhoades. Aug 63, 150p. 101refs
Contract AF 33(657)8657
ASD-TDR-63-413

DESCRIPTORS: *Lithium, Liquid metals, *Rubidium, Contamination, Vapor pressure, Oxygen, Nitrogen, Rubidium compounds, Monoxides, Lithium compounds, Nitrides, Viscosity, Experimental data, Carbon, *Alkali metals, Melting, Chemical analysis, Energy conversion, Heat transfer, Nuclear power plants, Electromagnetic pumps

A research program directed toward the goal of developing an improved understanding of contamination effects on liquid rubidium and liquid lithium systems is described. Experimental measurements were conducted on the vapor pressure of pure rubidium, the melting point of pure and oxygen-contaminated rubidium, and the melting point of pure and nitrogen-contaminated lithium. A capillary viscometer was designed and constructed and extensive viscosity data were measured for pure and oxygen-contaminated rubidium from less than 200 F to about 1200 F. Pumping experiments in an isothermal loop revealed that oxygen contamination is quite deleterious to the electromagnetic pumping characteristics of rubidium. (Author)

GEAP-4076 OTS $1.50

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
SPECIFIC ZIRCONIUM ALLOY DESIGN PROGRAM Quarterly progress rept. no. 2, Jul-Sep 62, by H. H. Klepfer, K. C. Antony, W. B. Nelson, D. L. Douglass and J. S. Armijo. 9 Oct 62, 65p 9refs
Contract AT(04-3)189
EURAEC-488

CVNA-159 OTS $7.60

Westinghouse Electric Corp., Pittsburgh, Pa.
EFFECT OF IRRADIATION ON MECHANICAL PROPERTIES OF CVTR PRESSURE TUBE MATERIAL, by W. R. Smalley. Sep 62, 78p 13refs
Contract AT(30-1)2289

PB 163 650 OTS $3.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
GALLING AND SEIZING CHARACTERISTICS OF TITANIUM AND TITANIUM-BASE ALLOYS. Final rept. by William C. Leone. 30 June 53, 31p
Contract DA 36-061-ORD-112
W. A. L. Rept. no. 401/65-22

DESCRIPTORS: *Titanium, Titanium alloys, *Friction, Lubrication, Thermocouples.

Pertinent data on dry friction characteristics for various loads and speeds are presented. Tests for establishing a criterion for evaluating galling characteristics are made and results discussed. Finally results of temperature measurements are given. (Author)

AD-263 483 OTS $5.60

Michigan U. Coll. of Engineering, Ann Arbor.
THE EFFECT OF GAMMA PRIME PARTICLE SIZE UPON THE HIGH TEMPERATURE PROPERTIES OF NICKEL-BASE ALLOYS, by David L. Sponseller and R. A. Flinn. Sep 60, 51p 4refs
Contract Nonr-1224(29)
Rept. no. IP-467

DESCRIPTORS: Heat resistant alloys, *Nickel alloys, Chromium alloys, Aluminum alloys, Additives, Titanium, Manganese, Dispersion hardening, Phase studies, Grains (Metallurgy), Crystal structure, Particles, Precipitation, Preparation, Melting, Cooling, Heat treatment, Deformation, Rolling mills, Hardness, Measurement, Microstructure, Electron microscopy, X-ray diffraction analysis, High temperature research, Tensile properties, Creep, Rupture, Stresses.

The control of the amount and size of precipitation-hardening particles in alloys is one of the metallurgist's most powerful methods for improving creep strength at elevated temperatures; however, only scant information is available concerning the dependence of high temperature strength and creep rate upon the characteristics of the precipitated dispersion. The purpose of this investigation is to study experimentally the influence of the γ' characteristics upon high temperature strength in nickel-base alloys. Specifically, the effects of particle size and of the relative amount of the γ' dispersion were investigated. In addition, the influence of various elements upon coherency effects was explored.

Structural Metallurgy and Corrosion

AGN-8063 OTS $9.10

Aerojet-General Nucleonics, San Ramon, Calif.
DETERMINATION OF TEMPERATURE COEFFICIENT OF SOLUBILITY OF VARIOUS METALS IN RUBIDIUM AND THE CORROSIVE EFFECTS OF RUBIDIUM ON VARIOUS ALLOYS AT TEMPERATURES FROM 1000 TO 2000°F. Topical rept. 1 Feb 61-31 Jul 62, by Peter F. Young. 101p 32refs
Contract AT(04-3)368

BMI-X-218 OTS $3.60

Battelle Memorial Inst., Columbus, Ohio.
CORROSION OF THE ORNL-VPP-MARK 3 FLUORINATOR AND GROUP V RODS, by P. D. Miller, E. L. White, J. D. Jackson, W. K. Boyd, and W. N. Stiegelmeyer. 15 Feb 63, 39p
Contract W7405-eng-92.

KAPL-2257 OTS $0.50

Knolls Atomic Power Lab., Schenectady, N. Y.
AQUEOUS CORROSION OF ZIRCONIUM SINGLE CRYSTALS, by A. E. Bibb and J. R. Fascia. Oct 62, 16p 10refs
Contract W31-109-eng-52

GEAP-3999 OTS $0.75

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
CORROSION MECHANISM OF ZIRCONIUM AND ITS ALLOYS, DIFFUSION OF OXYGEN IN ZIRCONIUM DIOXIDE, by D. L. Douglass. 27 July 62, 27p
Contract AT(04-3)189
EURAEC-455

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ANL-FGF-347 OTS $2.60

Argonne National Lab., Ill.
PREPARATION AND PROPERTIES OF URANIUM AND THORIUM MONOSULFIDES, by P. D. Shalek. 30 Apr 62, 24p 9refs
Contract W31-109-eng-38.
UAC-6504.

TID-18140 OTS $1.10

Argonne National Lab., Ill.
URANIUM-OXYGEN BONDING IN ALKALI METAL URANATES, by Henry R. Hoekstra. Dec 62, 6p 10refs
Contract W31-109-eng-38.

TID-8539 OTS $1.00

Atomic Energy Commission. Div. of Operations Analysis and Forecasting, Washington, D. C.
CALCULATING U-235 OUTPUTS AND CHARGES, by William H. McVey, Edwin H. Davidson, and Gerald E. McTigue. [1963] 43p

WAPD-TM-333 OTS $1.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
TIME-DEPENDENT FISSION-PRODUCT THERMAL AND RESONANCE ABSORPTION CROSS SECTIONS, by T. R. England. Nov 62, 67p 15refs
Contract AT(11-1)GEN-14

TID-18195 OTS $1.75

California Research Corp., San Francisco.
RADIOLYSIS OF ORGANIC FLUIDS, Annual progress rept. for 1 Oct 61-30 Sep 62, by R. O. Bolt, M. L. Burrous, J. G. Carroll, K. L. Hall, and M. A. Sweeney. 15 Jan 63, 72p 18refs
Contract AT(04-3)248

CUA-NE-24 OTS $4.60

Catholic U. of America, Washington, D. C.
AMERICIUM-BERYLLIUM AND PLUTONIUM-BERYLLIUM NEUTRON SOURCE RELATIVE EFFECTIVENESS IN PROMPT-GAMMA ACTIVATION ANALYSIS, by E. D. Jordan and H. E. Schierling. Nov 62, 46p
Contract AT(30-1)2586
NYO-9918

TID-17903(and Add. 1) OTS $4.60

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
SPECIFICATIONS FOR A HOT CAVE RADIOCHEMISTRY LABORATORY PROJECT, by V. Herrero Climent. Sep 62, 49p
Contract AT(11-1)1167

GA-3853 OTS $1.75

General Atomic Div., General Dynamics Corp., San Diego, Calif.
INTEGRAL NEUTRON THERMALIZATION. Quarterly progress rept. for period ending 31 Dec 62, by J. R. Beyster, J. R. Brown and G. K. Houghton. 11 Feb 63, 72p 17refs
Contract AT(04-3)167

HW-19771 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
GAS COMPOSITION FOR THE DIRECT HYDROFLUORINATION OF PLUTONIUM (III) OXALATE, by J. F. Facer and W. L. Lyon. 26 Dec 50, 2p
Contract AT(45-1)1350.

PB 163 360 OTS $1.10

High-Energy Physics Lab., Stanford U., Calif.
ELECTROMAGNETIC STRUCTURE OF THE GIANT DIPOLE RESONANCE, by F. H. Lewis and J. D. Walecka (Inst. of Theoretical Physics), J. Goldemberg and W. C. Barber. Apr 63, 10p 8refs
Contracts N6onr-251(16) and AF 49(638)388
HEPL-292; ITP-82

DESCRIPTORS: *Nuclear structure, Dipole moments, Differential cross section, Electrons, Inelastic scattering, Resonance scattering, Resonance absorption, Carbon.

Experimental and theoretical results on the nature of the giant dipole resonance in C^{12} are presented.

UCRL-5979 OTS $2.60

Lawrence Radiation Lab., U. of California, Livermore.
ALPHA AIR MONITORING WITH α/β RATIO COMPENSATION FOR NATURAL INTERFERENCE, by C. L. Lindeken and D. N. Montan. 5 Feb 62, 22p 10refs
Contract W7405-eng-48

UCRL-9793 OTS $1.10

Lawrence Radiation Lab., U. of California, Berkeley.
SEMIEMPIRICAL CORRELATION OF β^+ ANNIHILATION RATES IN METALS, by James A. McHugh. Jul 61, 7p 3refs
Contract W7405-eng-48

LAMS-2884 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
PROCESSING OF UC-PuC WITH TRIBUTYL PHOSPHATE, by D. F. Bowersox. 5 Jul 63, 15p 11refs
Contract W7405-eng-36

TID-18094 OTS $2.60

New Hampshire U., Durham.
THE EFFECTS OF RADIATION ON CHEMICAL SYSTEMS, Progress rept. 1 Jan-31 Dec 62. 23p, by Alexander R. Amell.
Contract AT(30-1)1911

NASA N63-19946 OTS $9.60

New York U. Coll. of Engineering, N. Y.
GEOMAGNETIC IMPLICATIONS OF THE COSMIC RAY DIURNAL VARIATION, AND ITS SPECTRUM. Final proj. rept. by Donald E. Cotten. 1 Mar 63, 119p 97refs.
Grant NsG 108-61 and Contract DA-36-039-sc-87171
ARPA Order 163-61; NASA CR-50733

ORNL-3432 OTS $2.25

Oak Ridge National Lab., Tenn.
ELECTRONUCLEAR DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1962. 93p 46refs
Contract W7405-eng-26

ORNL-3383 OTS $3.00

Oak Ridge National Lab., Tenn.
MONTE CARLO CALCULATIONS ON INTRANUCLEAR CASCADES, by H. W. Bertini. 1962, 226p 61refs
Contract W7405-eng-26

ORNL-TM-461 OTS $8.60

Oak Ridge National Lab., Tenn.
NEUTRON THERMALIZATION PROGRAMS FOR THE IBM 7090, by C. A. Preskitt, E. A. Nephew and M. E. Tsagaris. 25 Feb 63, 97p 4refs
Contract W7405-eng-26

ORNL-3425 OTS $2.75

Oak Ridge National Lab., Tenn.
PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING JANUARY 31, 1963. 7 June 63, 167p 200refs
Contract W7405-eng-26

TID-17534 OTS $2.60

Ohio State U. Research Foundation, Columbus.
NUCLEAR PHYSICS RESEARCH. Final rept. 1 Nov 50-30 Sep 62, by J. C. Harris, D. F. Herring, and K. W. Jones. Dec 62, 27p 18refs
Contract AT(11-1)147

TID-18131 OTS $12.00

Purdue U., Lafayette, Ind.
THE FISSION OF THORIUM AND RHENIUM INDUCED BY INTERMEDIATE ENERGY HELIUM IONS, by Marshall E. Davis. Jan 63, 167p 127refs
Contract AT(11-1)347

SRIA-101 OTS $4.60

Stanford Research Inst., Menlo Park, Calif.
RADIATION STABILITY OF ORGANIC LIQUIDS. Final summary rept. by E. M. Kinderman and A. H. Samuel. 15 Feb 63, 43p 14refs
Contract AT(04-3)115

WCAP-1866 OTS $4.60

Westinghouse Electric Corp., Pittsburgh, Pa.
PREPARATION AND PRELIMINARY THERMOELECTRIC EVALUATION OF THE URANIUM CHALCOGENIDES, by W. P. Blakenship. Oct 61, 45p 9refs
Contract AT(30-3)500

TID-17939 OTS $1.60

Wisconsin U., Madison.
RADIATION CHEMISTRY OF GASES, by John E. Willard. 1962, 16p 38refs
Contract AT(11-1)32

Elementary Particles

NAA-SR-MEMO-7776 OTS $4.60

Atomic International, Canoga Park, Calif
SIG-CUM. - A CODE TO TREAT ANISOTROPIC ELASTIC SCATTERING OF NEUTRONS, by F. D. Rudnick and H. J. Lorenzi. 22 Oct 62, 44p 4refs
Contract AT(11-1)GEN-8

NYO-9289 OTS $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
REGGEIAN ANALYSIS OF DISSIMILAR PARTICLE SCATTERING, by Richard E. Cutkosky. Jan 63, 6p 5refs
Contract AT(30-1)882

PB 163 359 OTS $1.60

High-Energy Physics Lab., Stanford U., Calif.
SEARCH FOR CHARGED PARTICLES WITH REST MASS BETWEEN THAT OF THE ELECTRON AND MU-MESON, by D. H. Coward (Doctoral thesis), B. Gittelman, H. Lynch, and D. M. Ritson. Mar 63, 19p 16refs
Contract N6onr-251(16)
Rept. no. HEPL-288.

DESCRIPTORS: *Charged particles, Electrons, Muons, *Pair production, Electron accelerators, Sensitivity, Nuclear spectroscopy.

Singly-charged particles with rest mass between that of the electron and mu-meson, produced by electromagnetic pair production, were searched for at the 1 BeV Stanford Electron Accelerator. The experiment had high sensitivity and when combined with theoretical electrodynamics results, rules out the existence of any but very short lived particles in the range from 1 to 175 m_e. (Author)

UCRL-9889 OTS $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
ELECTROMAGNETIC PROPERTIES OF A CHARGED VECTOR MESON, by James A. Young and Sidney A. Bludmen. 12 Oct 61, 32p 19refs
Contract W7405-eng-48

Instruments and Installations

BNL-6439 OTS $6.60

Brookhaven National Lab., Upton, N. Y.
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Los Alamos Scientific Lab., N. Mex.
INTEGRAL GAMMA AND NEUTRON MEASUREMENTS ON KIWI B-4A, by R. W. Henderson, F. C. V. Worman, F. M. Cox, and P. K. Lee. 29 May 63, 57p 7refs
Contract W7405-eng-36

LAMS-2904 OTS $0.75

Los Alamos Scientific Lab., N. Mex.
TEST CELL A SHIELDING STUDY, KIWI B-4A, by P. K. Lee, F. M. Cox, and W. H. Schweitzer. 27p 5refs
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New York U., New York.
PRODUCTION OF Mu MESON BEAM OF MOMENTUM ABOVE 6.5 Bev/c AT BROOKHAVEN AGS, by L. Marshall and T. Yamanouchi. 18 Jan 62, 37p (Prepared in cooperation with Rochester U.).
Contract AT(30-2)GEN-16

ORNL-332 (3 Ed.) OTS $2.50

Oak Ridge National Lab., Tenn.
HEALTH PHYSICS INSTRUMENT MANUAL, by D. M. Davis and E. D. Gupton. 1963, 152p
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Oak Ridge National Lab., Tenn.
TESTS OF HIGH-EFFICIENCY FILTERS AND FILTER INSTALLATIONS AT ORNL, by E. C. Parrish and R. W. Schneider. 1963, 45p 8refs
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Nuclear Engineering and Power

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NUCLEAR TECHNOLOGY DATA FOR SM-1, SM-1A, PM-2A, SM-2. 12 Jun 61, 36p 22refs
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5 Apr 60, 17p
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STEAM SEPARATION TECHNOLOGY UNDER THE EURATOM PROGRAM. Quarterly progress rept. 1 Oct-31 Dec 62. 10 Jan 63, 120p 5refs
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EURAEC-543

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Allis-Chalmers Mfg. Co., Washington, D. C.
TEMPERATURE DISTRIBUTION MODERATOR AND REFLECTOR REACTOR CORE. EXPERIMENTAL GAS COOLED REACTOR, by F. Cheng. 25 Apr 60, 85p 8refs

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Allis Mfg. Co., Washington, D. C.
HAZARDS REPORT -- SM-1A CORE II, by J. R. Coombe, L. D. Stephenson, and F. G. Moote.
18 Oct 62, 13p (Prepared in cooperation with Allis-Chalmers Mfg. Co., Schenectady, N. Y.)
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Argonne National Lab., Ill.
FLUORIDE VOLATILITY PROCESSING OF LOW ENRICHED FUELS, by A. A. Jonke, J. Fischer, and W. Mecham. Jul 61, 7p 3refs
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REACTOR DEVELOPMENT PROGRAM. Progress rept. May 63, 73p 6refs
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A SAFETY FUSE FOR URANIUM CARBIDE FUEL ELEMENTS IN THE S.G.R. CRITICAL ASSEMBLY, by J. F. Johnson. 16 Oct 62, 12p
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Atomic Power Development Associates, Inc., Detroit, Mich.
SODIUM HEATED STEAM GENERATOR SUMMARY. 19 Sep 62, 73p 48refs
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EURAEC-544

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FLOW DISTRIBUTION ACROSS THE CORE, SECTION II, Test evaluation on Core 1 Seed 2, by M. G. Friedman. 6 Mar 61, 14p
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T-550097

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Bettis Atomic Power Lab., Pittsburgh, Pa.
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CAL rept. no. AA-1506-W-1

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MONTHLY OPERATING REPORT/ON PWR OPERATION/, OCTOBER 1962.
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Fluor Corp., Ltd., Los Angeles, Calif.
EXPERIMENTAL ORGANIC COOLED REACTOR PRELIMINARY HAZARDS REPORT (ADDENDUM 2). Rept. on Contract AT(10-1) 1040. Apr 61, 122p.)

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A PROGRAM OF BASIC RESEARCH ON MECHANICAL PROPERTIES OF REACTOR MATERIALS. Quarterly progress rept. for period ending 31 Dec 62, by T. A. Trozera, R. H. Chambers and J. L. White.
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LAMPRE PROGRAM, Quarterly status rept. for period ending 20 May 63. 25 Jun 63, 17p
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300 MWe MULTIPLE BOILING SATURATED AND SUPERHEAT STEAM REACTOR PLANT STUDY
24 Jun 60, 131p 3refs
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Savannah River Operations Office, Atomic Energy Commission, Augusta, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. Jan 63, 10p

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PROGRAM FOR THE DEVELOPMENT OF PLUTONIUM RECYCLE FOR USE IN LIGHT WATER MODERATED REACTORS. Quarterly rept. no. 5, 1 Apr-30 Jun 62, by J. G. Carner, W. R. Morgan and M. A. Robkin. 15 Jul 62, 11p 3refs
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CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. RESEARCH AND DEVELOPMENT PROGRAM. Quarterly progress rept Oct-Dec 62. 28p
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FORTRAN PROGRAMS FOR COMPUTING ANGULAR DISTRIBUTIONS AND Q VALUES OF NUCLEAR REACTIONS, by H. W. Broek. 2 May 63, 43p 4refs
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RADIATIVE CAPTURE CROSS-SECTION MEASUREMENTS, Summary rept. 1 Mar 62-28 Feb 63, by E. Haddad, S. Friesenhahn, and W. M. Lopez. 1 Mar 63, 67p 11refs
Contract AT(04-3)167

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ANTIPROTON-NUCLEON CROSS SECTIONS FROM 0.5 TO 1.0 Bev, by Tommy Elioff, Louis Agnew, Owen Chamberlain, Herbert M. Steiner, and Clyde Wiegand. 12 Dec 61, 68p 52refs
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LOW-RADIOACTIVITY-LEVEL WASTE TREATMENT. PART II PILOT PLANT DEMONSTRATION OF THE REMOVAL OF ACTIVITY FROM LOW-LEVEL PROCESS WASTES BY A SCAVENGING-PRECIPITATION ION-EXCHANGE PROCESS, by R. E. Brooksbank F. N. Browder, R. R. Holcomb, and W. R. Whitson. 1963 70p 10refs
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Central Radio Propagation Lab., National Bureau of Standards, Boulder, Colo.
REFLECTION OF ELECTROMAGNETIC WAVES FROM INHOMOGENEOUS MEDIA WITH SPECIAL PROFILES. Scientific rept. no. 15 on Antenna Patterns in the Presence of Finite Ground Surfaces, by James R. Wait. 15 Nov 61, 43p 23refs
NBS rept. 7211; AFCRL-992

DESCRIPTORS: *Electromagnetic wave reflections, Electric fields, Dielectrics, Bessel functions, Partial differential equations, Special functions, Antenna radiation patterns.

The reflection of electromagnetic waves from planar stratified media is discussed in a relatively concise manner. Attention is confined to special forms of conductivity (or dielectric constant) profiles which lead to solutions in terms of Bessel functions. Most of the results, in equivalent forms, have already appeared in the literature. The present note is essentially a consolidation of known solutions and their (sometimes novel) applications to the determination of reflection coefficients. This report is to be a chapter in a book, "Electromagnetic Waves in Stratified Media." (Author)

AD-405 732 repriced OTS $3.00

Defense Documentation Center, Cameron Station, Alexandria, Va.
PLASMA PHYSICS AND MAGNETOHYDRODYNAMICS, comp. by Merrill F. Aukland. Jun 63, 171p
Suppl. to AD-271 170

DESCRIPTORS: *Bibliographies, *Plasma physics, Plasma jets, Plasma oscillations, Plasma sheath, Gas ionization, Electromagnetic waves, Microwaves, Nuclear physics, Shock tubes, Shock waves, Atmosphere entry, Magnetic pinch, Symposia, Abstracts, *Magnetohydrodynamics.

This supplement is an updating of the DDC report bibliography on Plasma Physics and Magnetohydrodynamics. The first unlimited unclassified bibliography on this subject appeared under AD-271 170 a little over a year ago. The format is similar to the original printing in that alphabetic subject breakdown has been organized from the abstract cards. There are no duplicate entries and where a reference might well occur under two or more subjects the compiler has had to arbitrate. Within each subject area reports prepared by Department of Defense contractors are listed alphabetically by source, contract and title; military reports are arranged by source and title. (Author)

TID-18129 OTS $2.60

Kansas U., Lawrence.
ELECTRON SPIN RESONANCE OF THE Z_1 BAND IN KCl WITH $SRCl_2$, by G. E. Conklin and R. J. Friauf. 1962, 26p 11refs
Contract AT(11-1)1197

TID-18146 OTS $1.60

Kansas U., Lawrence.
OPTICAL ABSORPTION OF COLOR CENTERS IN LITHIUM FLUORIDE CONTAINING MAGNESIUM ADDITIVE, by F. Pilcher, D. Schinke, and R. J. Friauf. 1962, 15p 6refs
Contract AT(11-1)1197

PB 158 526 OTS $6.60

Microwave Lab., Duke U., Durham, N. C.
ELECTRON SPIN RESONANCE OF AN IRRADIATED CRYSTAL OF DEUTERATED DL-TARTARIC ACID. ELECTRON SPIN RESONANCE IN A GAMMA-IRRADIATED SINGLE CRYSTAL OF DIGLYCOLIC ACID MONOHYDRATE. ELECTRON-MOLECULE AND ELECTRON-ATON COLLISION CROSS-SECTIONS FROM A CYCLOTRON RESONANCE STUDY OF FLAME GASES. ELECTRON-MOLECULE COLLISION CROSS-SECTIONS IN THE BURNED GASES OF A VARIETY OF FUELS. Rept. no. 34, 1 July-30 Sep 61, [1961] 70p 42refs
Contract AF 49(638)765.
AFOSR-1658.

DESCRIPTORS: *Single crystals, *Deuterated compounds, Tartrates, *Glycolic acids, Hydrates, Gamma rays, Radiation effects, *Free radicals, *Electron spin resonance, *Microwaves, *Cyclotron resonance phenomena, Electrons, Molecules, *Flames, Oxygen, Acetylene, *Ionized gases, Nitrogen, Helium, Argon, Neon, Water vapor, Carbon dioxide, *Fuels, Combustion.

A 104 item bibliography is included of papers from the Duke Microwave Laboratory published between 1953 and 1961.

ORNL-3422 OTS $1.50

Oak Ridge National Lab., Tenn.
ALPHA PARTICLE IONIZATION OF ARGON MIXTURES, FURTHER STUDY OF THE ROLE OF EXCITED STATES, by T. E. Bortner, G. S. Hurst, Mildred Edmundson, and J. E. Parks. 1962, 57p 13refs
Contract W7405-eng-26

MATT-162 OTS $0.50

Plasma Physics Lab., Princeton U., N. J.
A MONOCHROMATOR WAVELENGTH MODULATOR, by Authur F. Kuckes. Jan 63, 8p
Contract AT(30-1) 1238

PB 163 362 OTS $5.60

Princeton U. School of Engineering, N. J.
THE ACOUSTICS OF PERCUSSIVE INSTRUMENTS - A GEOMETRIC ANALYSIS. Rept. on Engineering Graphics Seminar, by Arthur L. Bigelow. 20 May 63, 55p
Technical Seminar Series rept. no. 6.

DESCRIPTORS: *Musical instruments, *Acoustic properties, Graphic analysis, *Geometry, Harmonic analysis.

NYO-3062 OTS $4.60

Princeton U., N. J.
ELECTRON PARAMAGNETIC RESONANCE IN SOME MOLECULAR TRANSFER COMPLEXES, by Dennis H. Stamires and John Turkevich. 20 Feb 63, 41p 12refs
Contract AT(30-1) 1158

PB 163 368 OTS $3.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
THE SOLUTION OF A TRANSITION PROBLEM IN A SUPERCONDUCTING STRIP, by Werner Liniger. 20 Jul 61, 35p 7refs
Contract Nonr-3504(00)
Research paper RC-502

DESCRIPTORS: *Superconductivity, Phase transitions, Numerical analysis.

The isothermal transition of a strip of superconducting material, from the superconducting state to the normal state, under the influence of a supercritical external magnetic field, is studied on the basis of the London theory of superconductivity. The problem can be formulated as a free boundary problem with parabolic differential equations which is solved mainly by numerical methods; an analytical solution in the form of series expansions is given for the early part of the transition. It is found that, in the beginning, the transition in the strip behaves almost like the transition in a half-space. However, the two differ quite drastically as the transition nears completion. It is pointed out that to predict the total transition time for the strip by extrapolating from the analytical solution for the half-space is incorrect. The results show that such an estimate for the transition time would be much too small. (Author)

Electricity and Magnetism

TID-14508 OTS $2.60

Los Alamos Scientific Lab., N. Mex.
$Pb(Sc_{0.5}NB_{0.5})_X\Phi_{1-X}O_3$, PEROVSKITE-TYPE FERROELECTRIC SOLID SOLUTIONS POSSESSING RELATIVELY LARGE SPONTANEOUS POLARIZATIONS, by V. J. Johnson, M. W. Valenta, J. E. Dougherty, R. M. Douglass, and J. W. Meadows. 9 Jan 62, 28p 17refs
Contract W7405-eng-36
LADC-4581

TID-18263 OTS $2.60

Michigan U., Ann Arbor.
A GENERAL EQUATION FOR THE CURRENT-POTENTIAL RELATIONSHIPS AT A ROTATING DISC ELECTRODE, by Ilana Fried and Philip J. Elving. 8 Feb 63, 23p 7refs
Contract AT(11-1)1148

TID-16818 OTS $1.10

Oklahoma State U., Stillwater.
DIELECTRIC LOSS MEASUREMENTS IN FERROELECTRIC MATERIALS, by J. W. Northrip. 21 Jun 63, 3p (Prepared in cooperation with Sandia Corp.)

Electronics

TID-17791 OTS $5.60

Microwave Lab., Stanford U., Calif.
SOME MEASUREMENTS OF STEADY AND FLUCTUATING PLASMA NUMBER DENSITIES BY A MICROWAVE METHOD, by F. W. Crawford and G. S. Kino. Oct 62, 55p 19refs
Contract AT(04-3)326
M. L. rept. no. 961

MATT-161 OTS $0.50

Plasma Physics Lab., Princeton U., N. J.
THE VARIATION OF NEUTRAL DENSITY WITH TIME IN C-STELLARATOR DISCHARGES, by D. J. Grove and W. Stodiek. Dec 62, 13p 1ref
Contract AT(30-1)1238

TID-18225 OTS $1.10

Stevens Inst. of Tech., Hoboken, N. J.
CHERENKOV-LIKE RADIATION BY PLASMA OSCILLATIONS, by G. Schmidt and G. Halpern. 1961, 5p 3refs
Contract AT(30-1)2813.

TID-18228 OTS $5.60

Stevens Inst. of Tech., Hoboken, N. J.
EXPERIMENTAL TRAJECTORY ANALYSIS OF CHARGED PARTICLES IN A CUSPED GEOMETRY, Special rept. by James Sinnis and George Schmidt. [1963] 54p 30refs
Contract AT(30-1)2813 and AT(30-1)1921
SIT-P-82(1/63)

TID-18216 OTS $2.60

Stevens Inst. of Tech., Hoboken, N. J.
FIELD REVERSAL IN TENUOUS PLASMA: EQUIPMENT STATUS REPORT, by W. Pak, K. C. Rogers, H. Huber, J. R. M. Coulter, and G. Schmidt. 1962, 23p 5refs
Contract AT(30-1)2813
SIT-P35(2/63)

Molecular Physics and Spectroscopy

TID-15951 OTS $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
A CASCADE MASS SPECTROMETER, by F. F. White, J. C. Sheffield, and F. M. Rourke. 26 Apr 62, 11p
Contract W31-109-eng-52

TID-16312 OTS $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
A 360° TANDEM MASS SPECTROMETER, by F. A. White and J. C. Sheffield. 25 Jun 62, 8p 5refs
Contract W31-109-eng-52

Optics

LA-2877 OTS $1.25

Los Alamos Scientific Lab., N. Mex.
LENS DESIGNING TECHNIQUE WITH THE 1962 LASL CODE FOR THE IBM 7090, by Berlyn Brixner. 5 Jun 63, 47p 8refs
Contract W7405-eng-36.

PB 163 314 OTS $3.60

Microwave Lab., Stanford U., Calif.
HIGH-INDEX-OF-REFRACTION SPHERICAL SHEATH COMPOSITE-ROD OPTICAL MASERS. Technical rept. by O. Svelto and M. DiDomenico, Jr. Oct 62, 31p 15refs
Grant NSF-22929
M. L. rept. no. 957

DESCRIPTORS: *Lasers, Masers, *Ruby, Rods, Composite materials, Water, Benzyl radicals, Benzoates, *Sapphires, Reffraction.

The focusing of pumping light by high index of refraction spherical and cylindrical sheaths covering a ruby rod maser material has been studied both theoretically and experimentally. In the experimental work the reduction in threshold pumping energy and the increase in optical output energy for the same ruby rod have been measured as a function of the index of refraction of the sheath by using spherical and cylindrical sheaths of water and benzyl benzoate which have indices of refraction of 1.33 and 1.57, respectively. The results of the measurements clearly show that the spherical sheath is better than the cylindrical sheath. In the theoretical work a thermodynamical method of analysis has been used to develop an approximate three-dimensional theory for the power absorbed per unit volume at each point in the rod. This theory treats the spherical and cylindrical sheath composite rod structures in an unified way. The theoretical results are in good agreement with the experimental ones. Moreover, the theory shows that the spherical sheath of sapphire is an optimum composite rod optical maser configuration. In fact, the theory predicts that in this case the threshold pumping energy for maser oscillation should be reduced by a factor of 4, whereas the cylindrical sheath of sapphire should only give an improvement by a factor of 2.4. (Author)

Solid State Physics

TID-17556 OTS $9.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
SOLID STATE SCIENCE. Annual rept. 20 Dec 62, 93p 9refs
Contract AT(30-1)2994.

UCRL-10152 OTS $8.10

Lawrence Radiation Lab., U. of California, Berkeley.
ON THE PLASTIC BEHAVIOR OF POLYCRYSTALLINE AGGREGATES, by John E. Dorn and Jim D. Mote. Mar 62, 89p 66refs
Contract W7405-eng-48

PB 159 687 OTS $4.60

Little, Arthur D., Inc., Cambridge, Mass.
A RADIATION TECHNIQUE FOR THE MEASUREMENT OF THERMAL CONDUCTIVITY OF SEMICONDUCTORS BETWEEN 1000 and 2000°C. Final rept., 14 Oct 59-31 Mar 61, by Peter E. Glaser, Sabino Merra, Wilbur K. Sepetoski, Daniel F. Comstock, and Alfred G. Emslie. 31 Mar 61, 42p 14refs
Contract Nonr-2974(00)
Rept. no. C-62403.

DESCRIPTORS: *Semiconductors, *Thermal conductivity, Measurement, Thermal radiation, *Thermocouple pyrometers, *Radiation pyrometers, Design, Calibration, Heat transfer.

This report details the apparatus constructed to perform the tests, the experimental procedures developed for carrying out thermal-conductivity tests, methods for measuring temperatures and heat fluxes, calibration procedures, error analysis, thermal-conductivity calculation procedures, results, and future plans. (See also PB 181 171)

PB 163 501 OTS $1.60

Merck Sharp and Dohme Research Labs., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS. Progress rept. no. 8, 1 Aug-30 Sep 61, by P. I. Pollak, J. B. Conn, E. J. Sheehan, and J. J. Kirby. [1961] 11p
Contract NObs-78503

DESCRIPTORS: *Thermoelectricity, Materials, *Chalcogens, Complex compounds, *Lead compounds, *Copper compounds, *Silver compounds, *Antimony compounds, *Selenides, Alloys, X-ray diffraction analysis, Calorimetry, Thermal conductivity, Specific heat, Test methods, *Crystal structure.

X-ray crystallographic analyses for $PbSb_2Se_4$ and $CuSbSe_2$ have been completed and tentative assignments of space groups have been carried out. Nine alloys of the system $3Ag_2X \cdot 2MX \cdot 3M'_2X_3$ have been prepared and preliminary surveys of their thermoelectric properties are reported. A differential thermal analysis setup has been constructed and has been used in the investigation of the metallurgical behavior of the alloys described in this report. A method to measure the specific heat of thermoelectric materials has been developed. (See also PB 160 852)

PB 163 502 OTS $1.10

Merck Sharp and Dohme Research Labs., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS. Progress rept. no. 9, 1 Oct-30 Nov 61, by P. I. Pollak, J. B. Conn, E. J. Sheehan, and J. J. Kirby. [1961] 10p
Contract NObs-78503

DESCRIPTORS: *Thermoelectricity, Materials, *Chalcogens, Complex compounds, *Silver compounds, *Lead compounds, *Antimony compounds, *Copper compounds, *Selenides, Alloys, Preparation, *Crystal structure, X-ray diffraction analysis, Impurities, Copper, Sodium, Thermal conductivity, Measurement.

Experiments are described concerned with the preparation of homogeneous and mechanically-sound samples of silver-antimony-lead selenide alloys. $3Ag_2Se\ PbSe - 3Sb_2Se_3$ was amenable to good measurements and was selected as a vehicle for doping studies using copper and sodium as the doping agent. (See also PB 163 501)

PB 163 503 OTS $1.10

Merck Sharp and Dohme Research Labs., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS. Progress rept. no. 10, 1 Dec 61-31 Jan 62, by P. I. Pollak, J. B. Conn, E. J. Sheehan, and J. J. Kirby. [1962] 11p
Contract NObs-78503

DESCRIPTORS: *Thermoelectricity, Materials, *Chalcogens, Complex compounds, *Copper compounds, *Antimony compounds, *Silver compounds, *Lead compounds, *Thallium compounds, *Selenides, Alloys, Preparation, *Crystal structure, Phase studies, X-ray diffraction analysis, Impurities, Sodium, Thermal conductivity, Measurement.

Experimentation was continued to identify the unknown phase appearing in a wide compositional range of the CuSbSe system. Most of the work consisted in careful examination of X-ray patterns and correlating results with those described in the literature for related compositions. A preparation of TlSbSe previously reported in the Russian literature was repeated, which indicated it to be isostructural with the series described above. (See also PB 163 502)

PB 163 504 OTS $1.60

Merck Sharp and Dohme Research Labs., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS. Progress rept. no. 11, 1 Feb-31 Mar 62, by P. I. Pollak, J. B. Conn, and E. J. Sheehan. [1962] 12p
Contract NObs-78503

DESCRIPTORS: *Thermoelectricity, Materials, *Chalcogens, Complex compounds, *Copper compounds, *Antimony compounds, *Bismuth compounds, *Selenides, Alloys, *Crystal structure, X-ray diffraction analysis, Impurities, Iodides.

Investigation into the nature and properties of complex chalcogenides containing copper has been extended. Exploration of the system $xCuSbSe_2-(1-x)Cu_3Se_2$ was concluded with some unsuccessful attempts to reverse the majority carrier type by doping with copper iodide. An examination was made of the alloys $xCuSbSe_2-(1-x)Cu_3SbSe_4$. A survey thus far completed has ranged over the compositions $0.0 \leq X \leq 0.5$. The tendency, is to adopt the sublattice of Cu_3SbSe_4, the characteristic diffraction lines of which have nearly the same intensity at $x = 0.5$ as for pure Cu_3SbSe_4. (See also PB 163 503)

ORNL-3443 OTS· $2.25

Oak Ridge National Lab., Tenn.
ANNEALING OF GAMMA RAY INDUCED CHANGES IN ANTIMONY DOPED GERMANIUM, by Jay Cee Pigg. 1962, 107p 38refs
Contract W7405-eng-26

PB 163 656 OTS $3.60

Pacific Semiconductors, Inc., Culver City, Calif.
STUDY OF SURFACES IN SEMICONDUCTOR DEVICES. Quarterly technical rept. no. 3, 1 Oct-31 Dec 57, by T. C. Hall and M. F. Millea. 13 Jan 58, 34p 6refs
Contract DA 36-039-sc-73229
Rept. no. 3000:8-9-Q; AD-163 326

DESCRIPTORS: *Semiconductor devices, Surface properties.

Surface lifetime and channeling effects on p-n junction structures in silicon on exposure to O_3-H_2O vapor cycle have been successfully demonstrated employing the flying light spot scanner. The application of polysiloxane films to the silicon surface inhibits channel formation in general whereas simple oxide films (e.g., etch stains) facilitate their formation. This result is in conformity with the hydrophobic nature of polysiloxane and the hydrophilic nature of silicon oxide. Surface condition is shown in the former case to be markedly reduced in sensitivity to changes in ambient chemistry in conformity with previous improved device performance and reliability observations. A brief general discussion on the state of field effect information is presented as an introduction followed by a description of apparatus employed in this laboratory in measuring field effect on silicon surfaces, both conventionally etched and polysiloxane-treated. Results indicate band structure at surface of n-type material is shifted upwards, more so in conventionally etched than in polysiloxane-treated surfaces. Thus the difference in potential between surface and bulk is less in the polysiloxane-treated than in the conventionally-etched condition on n-type silicon. (Author)
(See also PB 162 214)

PB 163 658 OTS $3.60

RIAS, Inc., Baltimore, Md.
EFFECT OF SURFACE COATINGS ON THE MECHANICAL PROPERTIES OF LITHIUM FLUORIDE CRYSTALS. Interim technical rept. by A. R. C. Westwood. Nov 59, 35p 13refs
Contract DA 36-034-505-ORD-11-RD
Technical rept. no. WAL TR-832/1

DESCRIPTORS: *Crystals, *Lithium compounds, *Fluorides, Mechanical properties, Tensile properties, *Coatings, Metal coatings, *Metal films, *Thin films, *Crystal lattice defects.

A study has been made of the mechanical behavior of coated and uncoated lithium fluoride crystals. The coatings were produced either by vacuum deposition or by chemical reaction with pure magnesium oxide powder at 600°-700°C. 'Thin' coatings ($\geq$10 μ thick) increased the yield stress of as-cleaved crystals some 50% but had little effect on the yield stress of chemically polished crystals. At the critical resolved shear stress, catastrophic stress drops were observed with thinly-coated as-cleaved crystals and the subsequent rate of work hardening was less than that of uncoated as-cleaved crystals. Thicker reacted coatings ($\geq$50 μ) increased both the yield stress and the flow stress of as-cleaved crystals ($\sim$ 60%) but stress drops were not observed. However, the stress and strain to fracture were reduced to half that of uncoated crystals. First cracks were always of the Stroh-type. An explanation for these results is offered based on considerations of the distribution of dislocations sources, and the piling up of dislocations at intersecting slip bands and beneath surface films. Metallographic evidence is presented for the pile-up of edge dislocations beneath surface films, at sub-boundaries and at intersecting bands of edge dislocations. (Author)

Thermodynamics

NAA-SR-MEMO-7815 OTS $2.60

Atomics International, Canoga Park, Calif.
CORRELATION OF VOID FRACTION FOR SANTOWAX-R DURING FORCED CIRCULATION BOILING AT LOW PRESSURE, by F. Bergonzoli and F. J. Halfen. 29 Oct 62, 26p 17refs
Contract AT(11-1) GEN-8

GEAP-3961 OTS $0.75

General Electric Co., San Jose, Calif.
PREDICTION OF THE CRITICAL HEAT FLUX IN FORCED CONVECTION FLOW, by S. Levy. 20 Jun 62, 35p 21refs
Contract AT(04-3)189

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 163 622 OTS $1.10

California U., Berkeley.
THE PUNCHING CODE FOR CHINESE TEXT. Rept. on Machine Translation Project, by C. Douglas Johnson. Aug 63, 10p

DESCRIPTORS: *Language, *Machine translation, *Coding, Punched cards, Biochemistry.

The code used in punching Chinese text is the Chinese Telegraphic Code together with certain additions to accomodate scientific, in particular biochemical, literature. The current version is intended for use in punching text for purposes of machine translation research, rather than machine translation production; accordingly, the code is incomplete or insufficiently differentiated in certain areas, notably the area of mathematical symbols.

PB 163 364 OTS $18.50

Computation Lab., Harvard U., Cambridge, Mass.
INVERSES OF PHRASE STRUCTURE GENERATORS.
Rept. on Mathematical Linguistics and Automatic Translation, by Sheila Adele Greibach. Jun 63, 299p 60refs
Grant NSF-G-24833
Rept. no. NSF-11

DESCRIPTORS: Theses, *Language, *Machine translation.

Chapter 1 introduces the subject of the thesis and lists the main results of the thesis. In Chapter 2 directed production analyzers are introduced and inverses are defined. The main result is that every context-free phrase structure generator has a directed production analyzer as an inverse. Chapter 3 discusses p-systems, d-systems and the hidden ambiguity problem. The main result is the undecidability of the two-way correspondence problem. Chapter 4 discusses special classes of DPA's. Chapter 5 discusses linear phrase structure generators and uses the results of Sec. 4.3 to prove various problems undecidable. The theory developed is applied to the Kuno-Oettinger multiple-path syntactic analyzer in Chapter 6. In addition, some further results on parsing languages are obtained.

PB 163 365 OTS $14.00

Computation Lab., Harvard U., Cambridge, Mass.
MATHEMATICAL LINGUISTICS AND AUTOMATIC TRANSLATION, by Anthony G. Oettinger. May 63, 208p 23refs
Rept. no. NSF-9, Volume I

DESCRIPTORS: *Language, *Machine translation.

Contents:
The multiple-path syntactic analyzer for English, by Susumu Kuno
Study of analysis output of the multiple-path English analyzer, by Susumu Kuno.

PB 163 366 OTS $14.00

Computation Lab., Harvard U., Cambridge, Mass.
MATHEMATICAL LINGUISTICS AND AUTOMATIC TRANSLATION, by Anthony G. Oettinger. May 63, 204p
Rept. no. NSF-9, Volume II

DESCRIPTORS: *Language, *Machine translation, Dictionaries.

Contents (Figures and appendixes for rept. no. NSF-9, PB 163 365):
Analysis output of the multiple-path syntactic analyzer of English, by Susumu Kuno
The current English dictionary with word forms alphabetically sorted
Word forms for each syntactic word class
Source subrules of syntactic role codes.

PB 163 484 OTS $7.60

Linguistics Research Center, U. of Texas, Austin.
THE CLASSIFICATION OF ENGLISH ADVERBIALS IN CORPUS 05, by Howard W. Law. Apr 63, 75p
Grant NSF-GN-54
LRC 63-WDE1

DESCRIPTORS: *Language, Classification, Machine translation.

Research conducted in connection with the classification of adverbials produced the survey presented in this paper. The resulting classification is tentative because, among other reasons, it deals only with data of a limited corpus. The scope of the problem and statements by some other authors are presented. The procedure of investigation involved a study of adverbial sequences and occurrences of adverbials in reference to verbals. Four classification sortings were used to aid the study.

PB 163 485 OTS $1.60

Linguistics Research Center, U. of Texas, Austin.
INTRODUCTION TO FORMATION STRUCTURES, by D. A. Senechalle. Apr 63, 20p 1ref
Grants NSF-G-19277 and NSF GN-54
LRC-63 WTM2

DESCRIPTORS: *Language, *Machine translation, Algorithms.

Contents:
Links
Formation structures.

PB 163 483 OTS $5.60

Linguistics Research Center, U. of Texas, Austin.
MACHINE LANGUAGE TRANSLATION STUDY. THE DEVELOPMENT OF A LINGUISTIC COMPUTER SYSTEM. Quarterly progress rept. no. 15, 1 Nov 62-31 Jan 63, by W. P. Lehmann and E. D. Pendergraft. Feb 63, 56p 25refs
Grant NSF-GN-54; Contract DA 36-039-sc-78911
LRC 63-P15

DESCRIPTORS: *Machine translation, *Language, Computers.

Progress is reported in the development of two generalized computer systems: the first designed to implement automatic translation of languages, the second to support basic research in linguistics. The systems complement each other in that programs prepared for each are applicable to, and needed in, the other. The common system design contains three sections: one for control, a second for language data processing, and a third for linguistic information processing. The first two sections are now operational. In the third, the capability to perform automatic lexical and syntactic analysis has been made operational. Probability metrics are associated with analyses so that they may be ranked by a choice heuristic. The programs are being tested with English, German, Russian and Chinese language data. (Author)

AD-409 623 repriced $0.50

Naval Ordnance Lab., White Oak, Md.
THE DEVELOPMENT OF AN EXPLOSIVE DRIVEN, SHUTTER-TYPE, HIGH PRESSURE RELEASE, by Rayner A. Montgomery and E. Eugene Kilmer. Apr 63, 18p 2refs
NOLTR 62-179

DESCRIPTORS: *Shock tubes, Explosive actuators, Valves, Hypersonic flow, Feasibility studies, Release mechanism.

An investigation was conducted to determine the feasibility of using a shutter-type pressure release for a 1-1/2-inch shock tunnel. This device was operated by an explosive driver producing opening times in the order of 500 microseconds. The shutter mechanism was tested up to 500 psi differential pressure. (Author)

SOCIAL SCIENCES

Documentation

PB 163 489 OTS $2.60

Association of Special Libraries and Information Bureaux, Cranfield (Gt. Brit.)
THE TESTING OF INDEX LANGUAGE DEVICES. Rept. on ASLIB Cranfield Research Project, by Cyril Cleverdon and J. Mills. [1962] 25p 9refs
Grant NSF G-23130

DESCRIPTORS: *Documentation, *Subject indexing, Indexes, Language, *Information retrieval, Effectiveness

This paper sets out the fundamental operations involved in compiling and using an index, shows how the various factors can influence the operating efficiency, and considers the methods to be used in the present Aslib Cranfield investigation.

AD-292 636 OTS $2.60

Belfour Engineering Co. [Suttons Bay, Mich.].
ESTABLISHMENT OF A MECHANICAL PROPERTY INFORMATION SYSTEM. Progress rept. no. 2, by R. C. Braden. 18 Dec 62, 24p
Contract AF 33(657)9149

DESCRIPTORS: *Data processing systems, *Documentation, *Data storage systems, Metals, Plastics, Coding, Mechanical properties, Information retrieval.

This period has been devoted to a review of objectives and methods for the storage of mechanical properties of metals and reinforced plastics. System operating details were the object of the major effort. Particular attention was directed to the area of code improvement.

PB 163 476 OTS $1.10

Lehigh U., Bethlehem, Pa.
STUDY OF THEORIES AND MODELS OF INFORMATION STORAGE AND RETRIEVAL. Annual rept. by Donald J. Hillman. 31 May 63, 9p
Grant G24070

DESCRIPTORS: *Data storage systems, *Information retrieval, *Mathematical models, Algebras, Theory.

The work has resulted in three reports: Problems, systems, and methods; The Boolean algebra model; A positive model for systems of special classification. In addition, work on a special theory of classification is in the final stages of completion.

PB 163 482 OTS $1.10

Patent Office, Washington, D. C.
ICIREPAT. AN INTERNATIONAL COMMITTEE OF PATENT OFFICE EXPERTS CONCERNED WITH THE PROMOTION OF COOPERATIVE RESEARCH PROGRAMS IN INFORMATION RETRIEVAL. Bulletin no. 2 by H. Pfeffer. Apr 63, 10p
Grant NSF GN-4

DESCRIPTORS: *Patents, *Information retrieval, Collaboration, *Scientific organizations, Scientific personnel

Contents:
In memoriam, Dr. h.c. Herbert Kuhnemann
Standing committees
New members
Steering committee meeting
New projects
Call for papers
Personnel
Research associates program

PB 163 478 OTS $8.10

Patent Office, Washington, D. C.
ICIREPAT. COMMITTEE FOR INTERNATIONAL COOPERATION IN INFORMATION RETRIEVAL AMONG EXAMINING PATENT OFFICES. PROCEEDINGS OF EXECUTIVE SESSIONS AT THE PATENT OFFICE OF THE FEDERAL REPUBLIC OF GERMANY, MUNICH, SEPTEMBER 4-6, 1962, by H. Pfeffer. [1962] 84p
Grant NSF GN-4

DESCRIPTORS: *Patents, *Information retrieval, Collaboration, *Conferences, Germany, *Scientific organizations

Contents:
Informal nature of ICIREPAT
Steering committee
  Composition
Chairman
  Method of selection and length of term
Secretary
Vice-chairman
Steering committee
  Scope of duties
  Filling vacancies
Meetings

New members
Secretariat
Standing committees
Exchange program
Selection of candidates and projects
Training program
Duplicate patent specifications
Bulletins
Annual meetings
Finances
Elections

PB 163 486 OTS $6.60

Statistical Techniques Research Group, Princeton U., N. J.
THE CITATION INDEX AND THE INFORMATION PROBLEM: OPPORTUNITIES AND RESEARCH IN PROGRESS. Annual rept. for 1962, by John W. Tukey. [1963] 66p 24refs
Grant NSF-G-22108

DESCRIPTORS: *Documentation, Indexes, *Subject indexing, *Information retrieval.

Contents:
Uses of citation indexes: The citation index in information delivery; the citation index as part of a kit of tools; starting; the use of permuted indexes; thinning; the use of titles and abstracts; retrieval, pursuit, or browsing; further possibilities
Trials of citation indexing in science: Ways of starting citation indexing; some less obvious differences; early trials; present programs
The cooperative program: The structure of the cooperative program; choice of scope; choices of representation; choices of arrangement and format; permuted indexes
Aims and accomplishments: Aims; accomplishments
Appendices.

PB 163 614 OTS $5.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
EXPERIMENT IN AUTOMATIC ABSTRACTING OF RUSSIAN. Progress rept. no. 3 on Computer-Aided Research in Machine Translation, by H. P. Edmundson, Jocelyn Brewer, Loretta Ertel, and Steven Smith. 20 Jun 63, 53p 3 refs
Grant NSF-C233
C157-3U1

DESCRIPTORS: *Documentation, Automatic, *Abstracts, Language, Machine translation

Previously devised methods of automatically abstracting English text by extracting certain sentences have been tested on Russian text. This experiment has confirmed the conjecture that these methods, based on general linguistic principles and specially constructed dictionaires, should receive extensive testing on Russian language documents. This small scale experiment suggests that automatic abstracting is as feasible for other Indo-European languages as for English. No conclusions are drawn regarding the operational utility of the abstracts. (Author)

MISCELLANEOUS

PB 181 418 OTS $1.25, $10/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Oct 63

DESCRIPTORS: *Naval research, *Scientific research, Plasma physics, Epoxy plastics, Atmosphere, Light transmission, Chemistry, Metallic soaps, Mechanics, Steel, Refractory materials, Rocket motor nozzles, Metallurgy, Titanium alloys, Niobium, Fracture (Mechanics), Crystal growth, Magnesium alloys, Domains (Crystallography), Nuclear physics, Exploding wires, Radio, Coding, Transponders, Target drones, Electron spin resonance, Glass, Gadolinium, Phosphorescent materials, Digital recording systems, Reports, Patents.

Contents:
Articles:
The PHAROS Experiment for Producing High-Temperature Plasmas, by H. R. Griem, R. C. Elton, A. C. Kolb, W. H. Lupton, and E. Hintz
Outgassing Characteristics of Some Epoxy Resins, by R. G. Taylor and R. W. Kreplin
Scientific Program:
Atmosphere and Astrophysics: Transmission of light signals over the horizon
Chemistry: Solubility of alkali-metal dinonylnapthalene sulfonates in various types of solvent and a theory for the solubility of oil-soluble soaps
Mechanics: New data confirm the effects of static and dynamic preloads on the stress-strain curve for a low carbon steel. Thermal shock evaluation of refractory materials as rocket nozzle inserts
Metallurgy and Ceramics: Development, welding, and casting of titanium alloys. Niobium and tantalum determination in titanium alloys by x-ray spectroscopy. Technique for determining the chronological order of events during growth of voids in the dimpled rupturing fracture process. Effect of interstitial contaminants on the high-temperature mechanical properties of niobium. Dynamical method for measuring crystal growth velocity. Effect of thermally activated Brillouin zone overlap on the lattice spacings of magnesium alloys
Nuclear and Atomic Physics: Bibliography prepared on photo- and electronuclear disintegrations. Summary report on work done at NRL on exploding conductors
Radio: Modular weight additive codes from n-11 to n-16. Moments of a sampled binomially distributed variable. Transponder for target drones
Solid-State Physics: Magnetic field strength measurements by an ESR technique. Euler-MacLaurin formula in three dimensions. Optical absorption in gadolinium-activated glass. Pressure dependence of the emission spectra of powdered inorganic phosphors
Sound: Magnetic digital recording system for field use
Published reports: Papers by NRL Staff Members
Patents

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